

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—19TH YEAR.

SYDNEY, SATURDAY, JUNE 11, 1932.

No. 24.

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### THE INTRAVENOUS ADMINISTRATION OF BLOOD, SALINE SOLUTION AND GLUCOSE.

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THE subject of blood transfusion is approximately three hundred years old. Libavius, quoted by Keynes<sup>(1)</sup> in his interesting historical account, gives the first known description of the process in a work published in 1615. The picture is so vivid that it merits reproduction in full.

Let there be present a robust healthy youth full of lively blood. Let there come one exhausted in strength, weak, enervated, scarcely breathing. Let the master of the art have little tubes that can be adapted one to the other; then let him open an artery of the healthy one, insert the tube and secure it. Next let him incise the artery of the patient and put into it the feminine tube. Now let him adapt the two tubes to each other and the arterial blood of the healthy one, warm and full of spirit, will leap into the sick one, and immediately will bring him to the fountain of life, and will drive away all languor.

Thirteen years later Harvey published his work "*Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus*", paving the way for all later progress in the medicine and surgery of the cardiovascular system. The first human transfusion was performed in 1667 by Jean Denys, physician to Louis XIV, using the blood of a lamb. There followed a period of many vicissitudes, with slow advance, due to ignorance of the problems of compatibility, and of a simple method of preventing clotting. Many workers contributed to the subject, but the great barriers were removed by Landsteiner, Shattock, Jansky and Moss with their work between 1901 and 1910 upon agglutinins and blood groups, and by Lewisohn and Hustin, who in 1914 showed definitely that quantities of sodium citrate adequate to prevent coagulation were not toxic. The first transfusion of citrated blood was given on November 14, 1914, by Professor Agote, of Buenos Ayres. The wide dissemination of a knowledge of this form of transfusion followed upon the necessities of the world war and the work of Oswald Robertson. During more recent years a great deal of experience has been gained and much research work has been accomplished. To those familiar with this work it must be matter for some surprise

that anything remains to be said of transfusion and infusion by authors of such brief experience as our own. We feel, however, that while we have nothing to add to the theory of the subject, yet the rather large number of cases that we have been privileged to handle, may enable us to clarify the everyday practice of transfusion and infusion to some extent. We are urged to attempt this by a very definite impression that a procedure in itself simple and calling for small equipment is all too frequently omitted because, first, its advantages are underestimated and, secondly, its risks are over-estimated. Our ambition is not to be exhaustive, but rather to show that the whole procedure may readily be made simple and efficient. Should we succeed in securing more frequent action upon the many indications for the infusion of blood and physiological solutions, we shall deem ourselves amply rewarded.

#### Routes of Administration of Saline Solution and Glucose.

The fact that we discuss the intravenous route only must not be taken to imply any neglect of the other routes, the value of which is universally recognized and which should be freely employed, whether alone or in combination.

The first and obvious mode of giving fluid is by mouth. Discussion of this is pointless and will be limited to the observation that all too frequently some misapprehension leads to the giving of inadequate or unknown amounts. The minimum requirement should be ordered quantitatively, and the actual intake should be accurately recorded, with any amounts vomited. It will be found that surprisingly large quantities can be given per day in the form of frequent small drinks. For infants and young children five fluid ounces of total fluids per pound per day, and for adults 150 to 200 fluid ounces per day should be readily attainable. If it is found difficult to give glucose or cane sugar, lactose will be found very useful, inasmuch as 20% solutions are not unduly nauseous, especially if a little lemon juice be added.

The rectal route offers the obvious resort when oral administration is impossible or inadequate by reason of vomiting, coma, anaesthesia, or the presence of some intrinsic contraindication, such as gastric ulcer or oesophageal stricture. It is of particular value when, as in diabetic coma, even incipient, or in profound shock, absorption of fluid ingested orally seems to be quite defective, owing to gastro-duodenal stasis. A striking case in point was that of a child of nine years under treatment for incipient diabetic coma, who vomited unaltered food taken seventeen hours previously.

For the subpectoral route there seem to be at least two clear indications—the case in which oral and rectal supply is inadequate, and the case, often of a moribund baby, in which the demand for fluid is imperative, while the risk of any considerable intravenous or intraperitoneal administration is, for the time being, too great.

Intraperitoneal administration has its definite place in the treatment of the dehydrated baby. It

should be limited to normal saline solution and should not be employed for moribund patients because of its undoubted element of shock, which frequently leads to death in the ill-chosen case and contributes to the sometimes dramatic relief of incessant vomiting in the well-chosen one.

So far as blood is concerned, the only route of which we are able to speak is the intravenous. Whatever path or combination of paths is chosen, it is incumbent upon the physician to see that adequate supplies of suitable fluid reach the body tissues. It is often urged against the intravenous route that fluid so introduced is rapidly excreted by the kidneys. We have not as yet thoroughly investigated this matter, but our observations lead us to believe that, as one would expect, in the presence of definite dehydration, this loss is small.

#### Indications.

It is not proposed to give a complete enumeration of the indications for the transfusion of blood or the infusion of saline solution, but merely to underline a few of the more common or more interesting indications and briefly to discuss the decision as to which course of treatment should be followed. In the broadest generalization, it may be stated that conditions of blood loss, anaemia and shock, implying reduced oxygen-carrying capacity, call for blood; dehydration, ketosis and intoxication for saline and glucose.

#### Exsanguination.

In exsanguination the classical case of the ruptured viscus rises to mind, with its call for urgent surgical treatment and the immediate restoration of the blood volume. Usually it is desirable to commence transfusion while preparation for operation goes ahead, and to continue during and after operation whether or not autotransfusion is employed.

K.P., aged eighteen years, was admitted to hospital on April 14, 1931, with the history that about fifty minutes previously he was involved in a traffic accident, which rendered him unconscious for a few moments. On recovery he felt very weak and had severe pain below the left costal margin. On examination the pulse rate was 120 and the pulse was barely palpable. Pallor was extreme, and there was slight rigidity with considerable tenderness over the whole of the left side of the abdomen. There was movable dullness in both flanks. Immediate splenectomy was undertaken by Mr. Basil Kilvington. The spleen was ruptured almost into three fragments and the peritoneal cavity contained clotted and fluid blood. During the operation one and a half pints of blood were transfused from a universal donor and about one pint of the patient's own blood was strained, citrated and returned to the veins. Ethylene and oxygen anaesthesia was used. When the patient was returned to bed, the pulse and colour were good, with a pulse rate of 90. Discharge to a convalescent hospital followed in two weeks, and progress was quite uneventful.

Hæmatemesis from peptic ulceration, in which the bleeding is still continuing, is regarded from two diametrically opposed points of view. Some surgeons hold that the fall in blood pressure is a potent factor in stopping the hæmorrhage; others believe that here, as in so many other situations, transfused blood is a powerful hæmostatic. There seems no real reason to believe that a gastric hæmorrhage

behaves differently from any other, and hence we favour transfusion as soon as the degree of exsanguination demands it. After the bleeding has stopped, if it has been considerable, much can be done to hasten convalescence, and probably also by fairly liberal transfusion to avert a recurrence of the accident.

C.F. was admitted to hospital on July 16, 1931, with the history that, having suffered from typical ulcer dyspepsia for twelve months, he had gross melæna four days previously, continuing for three days, with frequent motions. He had been hyperpnoëic and mildly delirious for three days, and during this time was conscious of arterial pulsation all over his body. The pulse rate was 136, with low volume and tension; pallor was extreme, and, after a few hours in hospital, the patient became very difficult to control. There was definite oedema of the feet. The day following his admission he received a transfusion of twenty-two fluid ounces of blood from a compatible relative. In thirty-six hours the delirium had cleared, the pulse rate was 100, with a fair volume, and the colour was greatly improved. In five days the pulse rate was only 80. The usual dietetic and medicinal treatment of peptic ulcer was given, and on the thirteenth day after admission the faeces being free of occult blood, a barium meal examination was made, revealing a duodenal niche. On the sixteenth day the administration of the citrate of iron and ammonium was commenced, in doses of 4.0 grammes (sixty grains) three times a day. From the twelfth day the pulse rate was always about 72, and on the thirtieth day he was sent home in normal health, with a hæmoglobin value (Tallqvist) of about 80%. Seen three months later, he was in excellent condition. His long stay in hospital was due to the difficulty of securing good dietetic management at home.

In the treatment of excessive hæmorrhage after such operations as tonsillectomy, especially in children, transfusion is to be regarded as the first and most valuable line of treatment, and as a necessary preliminary to anaesthesia for any attack on the bleeding point. It is no rare event for any further procedure to be unnecessary, and the patient has the advantage of an appreciably lessened post-operative debility and shortened convalescence.

#### *Pre-Operative Transfusion.*

Pre-operative transfusion is of the greatest value in such cases as menorrhagic anaemia and acholuric jaundice. Usually these are best transfused a day or two before operation, and, if necessary, again later.

#### *The Hæmorrhagic Diatheses.*

The hæmorrhagic diatheses may require blood either because the patient has become exsanguinated or to act as a hæmostatic. In the new-born the injection intramuscularly of ten cubic centimetres of whole blood has been shown to be most effective as a rule. These infants, however, withstand blood loss very badly, and transfusion must not be unduly delayed if there has been much loss before the patient was seen or if there is not a satisfactory response to the intramuscular injection. It may not be out of place here to utter a word of warning against the performance of any surgical procedure, however small, upon the new-born unless it is absolutely necessary. Such a minor matter as the snipping of a tongue-tie has led to threatened disaster.

Hæmophilia presents a major problem in itself to which there is no altogether satisfactory solution.

Even the pathology of the condition remains obscure. A great number of local and general measures have been tried and should not be discarded because of their failure in particular cases. Perhaps the most that can be said is that the condition is phasic and that death results from exsanguination. Further, there is an encouraging tendency to spontaneous cure after adolescence. It is therefore our plain duty to try to carry the patient on by early and repeated transfusion, whether in the belief that it will actually stop the hæmorrhage or in the hope that, given time, it will stop of itself.

J.O., a boy of twelve years, was admitted to hospital on September 13, 1930, with the history that an upper premolar tooth had been extracted twelve hours previously because of apical sepsis and that bleeding had been continuous ever since. From infancy he had shown some tendency to bleed excessively from small cuts and to bruise easily. There had never been any joint trouble. At the age of six years his coagulation time was five and a half minutes, his bleeding time was more than eighteen minutes, while the blood picture was normal. Two previous dental extractions had been followed by intermittent hæmorrhage for a day or two. No pertinent family history was elicited. He had been taking calcium lactate 0.6 gramme (ten grains) thrice daily for a week in preparation for the present extractions.

In the casualty department efforts were made to stop the hæmorrhage by means of hydrogen peroxide, turpentine, adrenalin and tannic acid without avail, and admission was decided on, the pulse being then rather poor and about 124.

Ferric chloride plugs were applied, two cubic centimetres of "Hæmoplastin" were given, with morphine 5.4 milligrammes (one-twelfth of a grain) hypodermically. These measures were fairly effective, and at 6 a.m. on September 24, 1930, fluids with glucose were given by mouth, with 10% glycerine added as an emollient for the mucosa, which was much damaged by ferric chloride. The pulse rate was then 120, the temperature 35.8° C. (96.4° F.), and the quality of the pulse was improving. On September 15, 1930, at 3 a.m., further hæmorrhage from the buccal wall of the socket on the right and from a palatal abrasion on the left continued, despite plugging and pressure. At 9 p.m. a transfusion of eighteen fluid ounces of citrated blood from his mother was given after satisfactory direct typing. Twenty minutes later vomiting occurred and a rigor, but no pain. Hæmorrhage ceased. On September 16, 1930, at 2 a.m., further bleeding occurred; plugging was used, morphine 5.4 milligrammes (one-twelfth of a grain) was given hypodermically. At 7 a.m. the patient passed urine looking like blood, "showing large amounts of hæmoglobin without intact red cells and with very numerous epithelial casts". The conjunctivæ were slightly icteric. The spleen was palpable. The first heart sound was of slapping character. At 12 midday bleeding was still occurring and the patient was very pale. At 2.15 p.m. a transfusion of twelve fluid ounces of Group IV blood was given; icterus was definite. At 4 p.m. his mouth was dry, his pulse and colour were much improved. On September 17, 1930, he was very much better and was taking soft diet well. On September 18, 1930, at 8 a.m., severe hæmorrhage occurred; peroxide pads under great pressure were applied, but were ineffective. At 11.30 a.m. plugs of fresh human muscle were applied under pressure and forty cubic centimetres of normal horse serum were given intramuscularly. Substantial control was obtained. At 7 p.m. there was a sudden severe hæmorrhage. At 9.30 p.m. a transfusion of eight fluid ounces of Group IV blood was given with improvement of his condition and cessation of hæmorrhage. Six fluid ounces of glucose and saline solution were given by the rectum. On September 19, 1930, at 9.30 p.m., it was noted that a slight ooze had continued all day; the patient was complaining of lumbar pain and was very pale. A transfusion of eighteen fluid ounces of Group IV blood was given with 0.5 gramme of calcium chloride. Raw blood dressings were applied to



the sockets. Morphine 6.0 milligrammes (one-tenth of a grain) was given hypodermically. Hæmorrhage ceased and the pulse improved. On September 20, 1930, the patient was in good condition. On September 21, 1930, at 1.30 a.m., slight hæmorrhage occurred; temporary packing with peroxide swabs was used with effect. At 2.30 p.m. further hæmorrhage occurred. At 4.30 p.m. a transfusion of sixteen fluid ounces of Group IV blood was given; the sockets were packed with cotton wool wrapped round solid tannic acid and soaked in adrenalin with excellent effect. On September 22, 1930, the patient was very well. He was given 20 cubic centimetres of "Coagulen Ciba". At 10 p.m. severe hæmorrhage occurred. On September 23, 1930, at 12.30 a.m., a transfusion of sixteen fluid ounces of Group IV blood was given and the sockets were plugged with raw blood, with immediate effect. At 8 p.m. severe hæmorrhage occurred. At 12 midnight a transfusion of fourteen fluid ounces of Group IV blood was given; morphine 5.4 milligrammes (one-twelfth of a grain) was given hypodermically; temporary cessation resulted. On September 24, 1930, despite plugging and morphine, slight hæmorrhage continued all night; the pulse rate was 132 in the morning. The patient was given ten cubic centimetres of normal blood into the buttock. Diathermic coagulation of socket tissue was carried out. At 8 p.m. further dental hæmorrhage occurred. On September 25, 1930, at 1 a.m., two cubic centimetres of "Hæmoplastin" were given in the hope of producing anaphylactic shock; there was no result. At 1 p.m. the patient was very pale and weak, his pulse rate was 140; a transfusion of one pint of Group IV blood was followed by a sharp rigor, but no other development. At 9 p.m. he had intense urticaria all over the body; this was left untreated for two hours and was then stopped with 0.36 mil (six minims) of adrenalin, which had immediate effect. On September 26, 1930, he was well; there was no hæmorrhage. On September 27, 1930, slight hæmorrhage occurred in the evening; dental wax plugs were applied with effect. On September 28, 1930, at 1 a.m., slight hæmorrhage occurred; 0.5 cubic centimetre of "Hæmoplastin" and of normal serum was given in an attempt to produce further anaphylactic shock, but with no effect; at 4 p.m. vulcanite plugs were made, fitting on the adjoining teeth. From this date there was no further hæmorrhage, the sockets granulated and the general condition steadily improved, until on October 6, 1930, he was discharged for a week at the Convalescent Cottage, having 5,120,000 red cells per cubic millimetre, with 390,000 platelets and a Tallqvist hæmoglobin reading of 85%. Later progress has been uneventful to date. (For brevity, all supportive and general treatment has been omitted from this account.)

#### Shock.

In our present ignorance of the physiology of shock, its treatment is still the subject of much debate. The giving of blood, of saline solution and of gum-saline solution have all been advocated, as also has been extreme conservatism. Our own preference, admittedly based on a modest experience, is for blood, whether or not there has been any accompanying blood loss. Mann<sup>(2)</sup> states, as a result of animal experiments in which shock was produced by handling the viscera, that by far the best results were obtained by giving blood or blood serum. Keith<sup>(3)</sup> has shown that the diminution in circulating blood volume in severe shock is comparable to that in severe hæmorrhage. The treatment of shock remains at times a matter of profound disappointment, probably by reason of the accompanying damage to vital centres; but it seems clear that the use of transfusion, with all the accessory measures—warmth, relief of pain and restlessness, and posture—offers the patient his best hope.

S.B., a boy of fifteen years, was admitted to hospital at 3.45 a.m. on December 15, 1931, having suffered in a rail-

way accident traumatic amputation above the left knee, pulping of the right foot, compound fractures of the right leg and a severe laceration of the right thigh opening the knee joint. He had had morphine 0.015 gramme (one-quarter of a grain) shortly after the accident, which occurred one hour before admission. The injured limbs were covered with flanne dressings, and an electric bath was placed over the patient pending operation. As he was in surprisingly good condition, immediate operation was decided upon to avert secondary shock, and in forty minutes amputation of both lower limbs through the thigh was commenced by Mr. A. E. Coates under nitrous oxide anaesthesia. During operation one pint of Group IV blood with one pint of 5% glucose saline solution was given. One thousand units of anti-tetanus serum and 25 cubic centimetres of anti-gas-gangrene serum were given intramuscularly. The patient was returned to bed with subpectoral injections of saline solution and electric bath, and did uneventfully well until the third day, when there was evidence of gas gangrene infection. Typical organisms were recovered from the wounds. This condition yielded well to treatment, and at the time of writing the patient is doing very well.

With regard to the shock attending upon major operative procedures, it is a very striking fact that collapse and death can follow, even in the absence of any considerable blood loss. Long reconstruction operations about the hip joint have been prominent as causes of grave shock. For such cases it does not seem too much that arrangements for transfusion should be made in advance, and that the process be carried out either before the patient leaves the table or thereafter on the earliest indications. Shock in these cases has usually been seen to come on with alarming rapidity. One child, having left the table in apparently good condition, was dead within the hour, the *post mortem* findings being normal.

The treatment of the shock phase of burns is a matter in which we have insufficient experience to be dogmatic. It seems rational to suppose, however, that a well conducted transfusion can do little but good.

#### Dehydration and Ketosis.

Dehydration and ketosis, though essentially separate entities, go so often hand in hand that their treatment can scarcely be divorced. They are seen in *diabetes mellitus*, colitis, cyclic vomiting, post-anaesthetic acidosis and the like. The primary needs are for water and for glucose, and these may readily be supplied in the form of saline solution with 5% or 10% of glucose added. Whether glucose will be used, and its proportion, and whether insulin is to be added must be decided in each case according to the presence or absence of hyperglycæmia and the degree of the acidosis.

A.G., a male child, aged three years, and weighing twenty-eight pounds, who was a proven diabetic, was admitted to hospital on November 23, 1931. He was drowsy and presented the classical picture of incipient diabetic coma with gross air hunger, acetonous odour of the breath, a thready pulse of 160 to 180 per minute, sunken eyes, dry inelastic skin, and a parched tongue. The urine was loaded with sugar and diacetic acid. On admission thirty units of insulin were given intramuscularly, warmth was supplied by an electric bath, and liberal fluids were administered both orally and rectally in the form of saline solution. Half an hour after admission half a pint of normal saline solution was infused into the median vein of the elbow, together with 30 units of insulin and 0.3 mil (five minims) of adrenalin. This procedure was repeated six hours later, the administration of fluids and



insulin by the other routes having been continued meanwhile. Twelve hours after admission the child was vastly improved. The blood sugar was 0.15 milligramme per 100 cubic centimetres, the pulse was 120 and of moderately good volume, the systolic blood pressure was 80 millimetres of mercury, and the air hunger was only slight.

It cannot be too forcefully stressed that the early, liberal and frequent administration of fluid intravenously is an essential part of the treatment of incipient diabetic coma. The dehydration, depleted blood volume and circulatory failure are thus relieved. We are greatly indebted to Lawrence for his recent convincing article,<sup>(4)</sup> in which it is made abundantly clear that the presence of circulatory failure implies inefficient absorption of fluid from the alimentary tract or the subcutaneous tissues.

J.F., a male baby, aged five months, and weighing twelve pounds, was admitted to hospital on October 15, 1931. For the past twenty-four hours the child had been vomiting every few minutes and had passed two offensive stools. Examination revealed a drowsy, restless, sunken-eyed child with the cherry-red lips and air hunger of marked acidosis. The temperature was 40.5° C. (105° F.), the pulse 160 and the respirations 56 per minute.

The increased respiratory rate led the admitting officer to make the misdiagnosis of pneumonia. The chest was clear to both clinical and radiological examinations, and the other findings were normal, apart from the dry inelastic skin and the sunken fontanelle typical of a dehydrated baby. The diagnosis of bowel intoxication and acidosis was made. The treatment consisted of liberal administration of a solution of 20% glucose, which the child took eagerly by mouth. A pint was given in the first six hours without the occurrence of vomiting. This was complemented by two intravenous administrations at six-hourly intervals of five ounces of 10% glucose in normal saline solution, five units of insulin having been given subcutaneously fifteen minutes previously. The intravenous injection was made into the superior longitudinal sinus by means of Kauffman's syringe and the gravity funnel. Twelve hours after admission the child looked vastly improved and the air hunger had passed off. He was discharged on November 3, 1931, after careful dietetic treatment had been carried out.

#### Acute Toxæmia.

Patients suffering from acute toxæmia, notably those of infantile dysentery due to Flexner's bacillus, are definitely benefited by small transfusions in conjunction with the administration of fluids by the intravenous and other routes.

A.A., a Greek baby, aged thirteen months, weighing seventeen pounds, was admitted to hospital on December 8, 1930. For the previous three days he had been very ill, with vomiting and diarrhoea. The motions contained pus, blood and slime. Physical examination disclosed the usual picture of a severe dysentery, the toxic and dehydration factors being shown by the semi-comatose condition, the sunken half-closed eyes, the carinate abdomen, the dry toneless skin. The temperature was 39.4° C. (103° F.), the pulse 140 and the liver was just palpable below the right costal margin. The spleen was impalpable.

Bacteriological examination of the stools revealed the *Bacillus dysenteriae* (Flexner). Liberal fluids and a high carbohydrate diet were administered. On December 9, 1930, the day after admission, the child was definitely worse. A blood transfusion was decided upon owing to the gross toxæmia and the circulatory failure. The child's father was found to be a suitable donor, and half a pint of his blood, citrated, was transfused into the vein opposite the right medial malleolus. The patient's condition definitely improved after this procedure, but the toxæmia and the diarrhoea persisted.

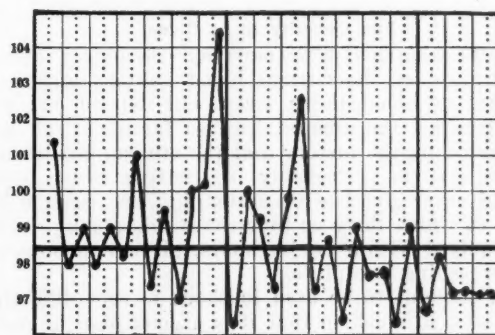
On December 10, 1931, half a pint of 10% glucose in normal saline solution, with ten units of insulin, was introduced with benefit into the same vein. This was repeated on the left leg on December 11, 1930. On

December 13, 1930, the child was in *extremis*, and half a pint of the father's blood was again administered, the direct typing having been repeated. From this time there was gradual improvement, assisted by another intravenous glucose-saline solution injection of half a pint on December 15, 1930. With careful dietetic management and heliotherapy the child was gradually nursed back to health and was discharged from hospital on January 7, 1931.

Flexner dysentery in infancy is a self-limited disease, improvement commencing as a rule in the third or fourth week. In Melbourne we have had no definitely beneficial results, either from anti-dysenteric serum or from the bacteriophage. It remains for us to combat the toxæmia and the dehydration by liberal administration of fluids and to maintain the body nutrition by means of a well balanced and easily assimilable diet. By these means we can reduce somewhat the mortality rate, which is at present about 40%. In the severe cases the oral administration of fluids is not sufficient, so that other routes must be utilized. We have found the intravenous path satisfactory in selected instances, and the case described above is a definite triumph for intravenous therapy, as, in a series of two hundred consecutive cases of Flexner dysentery at the Children's Hospital, it was the most severe in which recovery has occurred. The decided benefit derived from the administration of blood in a case of acute toxæmia is also instructive. In the near future blood transfusion may play an important part in the treatment of the acute toxæmias of infancy and childhood.

It is also of great interest to note that the same child was readmitted to hospital on February 18, 1931, with the diagnosis of pneumonia.

There had been intermittent feverishness and sweating for the past three weeks. Physical examination revealed nothing abnormal, apart from an enlarged spleen palpable two finger-breadths below the left costal margin. The child ran an intermittent temperature with rigors preceding the evening rises.



The blood was examined by Dr. Reginald Webster, who found the classical picture of quartan malaria. The pyrexia responded to quinine sulphate 0.3 gramme (five grains) given every four hours. The father gave a history of influenzal attacks in the tropics during his sailor days, but he had an impalpable spleen and had been in good health for the last year. Seen one year later, the child had been perfectly well in every way and the spleen was just palpable.

Apart from therapeutic cases, there had been no recorded instance of malarial infection in the State of Victoria until this was produced by transfusion.

Of exsanguino-transfusion we have had no experience. It is advocated in burns and acute toxæmias. The reader is referred to the writings of L. B. Robertson.

#### *Chronic Sepsis.*

In cases of chronic sepsis, such as low-grade septicæmia and chronic osteomyelitis, although one hardly sees the dramatic results of the more acute cases, there is little doubt that considerable assistance is to be derived from repeated small transfusions at intervals, combined with the administration of iron and sunlight in liberal dosage. Attention may, in passing, be drawn to the effect of prolonged sepsis upon the activity of bone marrow, leading to aplasia.

#### *Athrepsias.*

Finally, we must consider that difficult but interesting class of cases, the athrepsias of infancy. When all else has failed, aid in substantial measure has sometimes come from blood transfusion, helping to tide the child over until, in some mysterious manner, its perverted metabolism is rectified.

#### *Hypertonic Glucose Solutions.*

Hypertonic glucose solutions are mentioned only for the sake of completeness. As with the other solutions, rectal administration is often of great use (25% or 50% solutions of magnesium sulphate are generally used by this route), either alone or in conjunction with intravenous treatment. The object of the administration is the reduction of intracranial tension in such conditions as post-traumatic cerebral oedema, uræmia and cerebral tumour. The usual dosage for the adult is 50 cubic centimetres of a 50% solution. Great care must be taken in the injection of the solutions, as extensive tissue damage may result if any is allowed to leak outside the vein.

#### *The Quantity to be Given.*

In the treatment of hæmorrhage the object is the restoration of the normal blood volume, and the amount of blood to be given will depend almost wholly upon the amount lost, so far as it can be estimated by the history and the clinical condition of the patient. Probably in treating adults one should never give less than one pint, and cases will arise in which three or four times this amount will be required within twelve hours, given in amounts not exceeding two pints.

The amount to be used in shock is very difficult to assess, so much so that it is a good plan to give an initial one to one and a half pints as a routine.

For infants and young children it is a fair working rule to give up to 10 cubic centimetres of blood per pound. In the case of saline solution this figure may be increased to 15 cubic centimetres if dehydration is gross, provided extreme care is exercised as to the rate of giving.

Older children approximate to the adult rather than to the infant, so that for a child of twelve years 20 fluid ounces of blood is a not unreasonable maximum in severe hæmorrhage.

In diabetes, where the dehydration factor is of grave importance, large amounts of saline solution may be used with advantage, one or two pints being given to an adult several times in twenty-four hours.

#### *The Rate of Infusion.*

The rate of infusion is even more important than the actual quantity given. It is absolutely essential that the cardio-vascular system be allowed time to accommodate itself to the changing blood volume. In the adult the giving of one pint of fluid should occupy twenty to thirty minutes at least, and longer for patients who are very ill. The time taken for the appropriate full dosage for infants and children should also be twenty to thirty minutes.

Throughout the administration watch should be kept for any sign of overtaxing of the cardio-vascular system. The first symptom is usually a sense of tightness in the chest or of vague epigastric discomfort or pain. When this appears, infusion should be discontinued. After a few minutes the discomfort will have passed off and, if necessary, infusion may be resumed. In older children and adults this should be the only sign observed. If it is disregarded, vomiting, respiratory distress, slight pulmonary oedema, failing and running pulse, venous distension and other signs of cardiac embarrassment may be observed in that order. Any definite sign of circulatory distress is an indication for immediate venesection.

#### *Complications of Blood Transfusion.*

The complication of cardio-vascular embarrassment has been dealt with above, together with its prophylaxis and treatment.

Air embolism is very readily avoided, as will be emphasized later. Very small bubbles have undoubtedly been introduced on many occasions without any perceptible harm resulting.

Agglutination and hæmolysis provide the major complications. The former, which always precedes the latter,<sup>(5)</sup> is almost wholly avoidable by careful typing of the blood used; the latter is seen occasionally in mild degree, especially in repeated transfusion, and it is presumably consequent upon minor degrees of agglutination insufficient in themselves to produce the full picture. The true agglutination reaction we have never had the opportunity to observe. We quote Peterson's description from Keynes:<sup>(1)</sup>

The clinical picture of these reactions is typical. They occur early, after the introduction of 50 or 100 cubic centimetres of blood; the patient first complains of tingling pains shooting over the body, fullness in the head, an oppressive feeling about the precordium and, later, excruciating pain localized in the lumbar region. Slowly but perceptibly the face becomes suffused, a dark red to a cyanotic hue; respirations become somewhat laboured, and the pulse rate, at first slow, sometimes suddenly drops as many as from 20 to 30 beats a minute. The patient may lose consciousness for a few minutes. In one half of our cases an urticarial eruption, generalized over the body, or limited to the face, appeared with these symptoms. Later the pulse may become very rapid and thready; the skin becomes cold and clammy, and the patient's condition is indeed grave. In from 15 minutes to an hour a chill occurs, followed by a high fever, a temperature of 39.4°

to 40-5° C. (103° to 105° F.), and the patient may become delirious. Jaundice may appear later. The macroscopic appearance of hæmoglobinuria is almost constant.

The minor hæmolytic reactions are characterized usually by a mild rigor some little time after the transfusion, sometimes with a little vomiting or a mild urticaria, followed by macroscopical hæmoglobinuria with many epithelial casts and a rapid rise in blood urea. The urinary phenomena are due to the precipitation of hæmoglobin in the acid urine of the tubules,<sup>(6)</sup> and this can be minimized or prevented in the case of leisured transfusions by a preliminary alkalization of the urine.<sup>(7)</sup>

#### Selection of a Donor.

In certain cases, such as those of ruptured viscus or ruptured ectopic gestation, the patient's own blood has been returned to the veins after citration and filtration, in the process termed auto-transfusion. As to the desirability of this course there appears to be considerable divergence of opinion among those who practise it most. Our own acquaintance has been limited to some half dozen cases of ruptured viscus in which the procedure has been quite satisfactory; but we feel that the question should be left to those of wider experience. However, a supplementary hetero-transfusion is usually desirable, and for this reason a suitable donor should be at hand when the operation is commenced.

In selecting a donor it is of course advisable to avoid the frail, the elderly, and the adolescent, as also those in poor general health. Blood has been taken in amounts of one to one and a half pints from healthy donors of every age between twenty and sixty, and of either sex, without any apparent detriment; in fact, many donors, and particularly those of hyperpietic tendency, seem to enjoy a definite sense of improved health.

With regard to transferable disease, the two which in practice call for attention are syphilis and malaria. If it is at all possible, it is desirable to employ donors in whom the Wassermann test is known to have yielded no reaction. At all events, every donor should have the significance of the matter explained to him and should then be asked for any history of this nature. The possibility of conveying malarial infection in Australia is small, but the case cited above under the discussion on acute toxæmia suggests that a simple inquiry is worth while.

#### Blood Typing.

One or more potential donors having been selected, there remains the all-important matter of blood typing. Landsteiner in 1901 discovered that a destructive action was exerted upon the blood of certain individuals by that of certain others. Jansky, working in 1907, and later Moss have very closely investigated this matter. The practical outcome of this work is that there exist four definite groups of human individuals, whose blood shows distinctive interactions. It is found that an agglutinative reaction first occurs, sometimes followed by

hæmolysis; and for this reason the clinical examination of blood with a view to transfusion is directed solely to the presence or absence of agglutination. The reaction depends upon two factors, one residing in the serum and one in the corpuscles, termed agglutinins and iso-agglutinins respectively, and concerning these the following working explanation is usually adopted.

Two distinct types of each of these are considered to exist, characterizing Groups II and III; so that the serum of each group agglutinates the corpuscles of the other. Group I corpuscles possess iso-agglutinins of both types, and therefore the corresponding serum can have neither agglutinin; Group IV serum possesses both agglutinins, and therefore the corresponding corpuscles can have neither iso-agglutinin.

In the light of this explanation the interactions depicted in the accompanying table are comprehensible, - representing no agglutination, and + representing agglutination.

Corpuscles.	Serum.			
	I	II	III	IV
I	—	+	+	+
II	—	—	+	+
III	—	+	—	+
IV	—	—	—	—

In practice the point of importance is the effect of the recipient's serum upon the donor's corpuscles, the converse effect having, for some reason not quite satisfactorily explained, no clinical significance.

It is often stated that the blood of a young infant is without agglutinins, and that it is therefore safe to use blood of any type in giving transfusions to these patients. Investigation has, however, shown that agglutinins are present, though usually in small amounts, and that, while it is uncommon for serious consequences to occur, it is yet desirable in the interests of safety to type the blood in these cases as in any other. In view, moreover, of the simplicity of cross-typing, there seems no real reason why this should not be employed.

During recent years a wealth of information has been gained concerning the blood groups, and this has resulted, notably in America, in great technical refinements in the process of typing. In current practice, however, two methods are in common use, and while of the utmost simplicity, they have given full satisfaction.

#### Indirect Typing.

For indirect typing it is necessary to possess known stock sera of Groups II and III, of each of which a drop is placed upon a clean slide or a white tile. A suspension of the blood to be examined is prepared in 2% sodium citrate solution of such a strength as to have a light red tint. A



drop of this suspension is thoroughly mixed with each of the drops of serum. During the next few minutes the appearance of the mixtures is closely watched for the appearance of agglutination. The slide is held between the observer and a good light, and is inclined first in one direction and then in another, so that the drops flow over the surface. In the absence of agglutination, the mixture retains its homogeneous appearance, or at most shows an almost microscopical granular texture.

If agglutination occurs, the granular texture is seen to become coarse, giving the semblance of sand suspended in water, and later crude clumping of the corpuscles may occur, leaving clear serum between. The appearances are depicted in Figure XII (see special supplement). It is necessary to mention that a sufficient quantity of serum and suspension should be used, a liberal drop of each, to avoid drying during the few minutes of examination, otherwise appearances suggestive of agglutination may give rise to doubt.

In practice agglutination will usually appear in from two to five minutes, if it is to occur at all. If agglutination is not seen in five minutes, it will not occur at all. As to the interpretation of results, referring to the table above, we see that if agglutination has occurred in both specimens, the corpuscles must have belonged to Group I; if with the Group III serum only, to Group II; if with the Group II serum only, to Group III; and if in neither case, to Group IV. Both donor and recipient are tested in this manner and should they be of the same group or the donor be of Group IV or the recipient of Group I, the next examination should be proceeded with.

#### *Direct Cross Typing.*

For direct cross typing all that is necessary is a suspension of each of the two specimens of blood to be examined in a 2% solution of sodium citrate. A drop of each is mixed upon a slide, and watch is kept for the appearances already described above. Should agglutination occur, obviously the two specimens belong to different groups and transfusion could not be contemplated.

It is a matter of profound regret that the medical profession of Australia has not any recognized source of healthy, typed donors. The splendid service rendered in public hospitals by the Australian Red Cross Service is too well known to call for comment, and only serves to emphasize the need for a similar service for private use.

#### *The Citration of Blood.*

Methods of whole blood transfusion are adequately described in the standard text books. We have never used them and have therefore no comment to offer. It seems to be agreed among those who have used both, that the citration method is simple in practice, and therefore to be commended for general use. There seems to be no practical ground for dissatisfaction with it.

Opinion as to the amount of citrate to be used varies widely. Keynes mentions two grammes in 100 cubic centimetres of water for 900 cubic centi-

metres of blood. For some years more than four times this amount has been in use at the Melbourne Hospital without any observed ill effect. Whatever amount of citrate is used, it is usually prepared in either 2% solution or in Robertson's 3.8% strength, which was designed to give an iso-osmotic solution, 160 cubic centimetres being mixed with 750 cubic centimetres of blood. Robertson's figures have been closely followed in the usual practice here, five fluid ounces of 3.8% solution being used with one to one and a half pints of blood. It is sufficiently obvious both that sodium citrate is not to be regarded as toxic in any reasonable dosage and that widely varying figures may be adopted without introducing any technical difficulty.

#### *Taking the Blood.*

The source of blood commonly chosen, and a very convenient one in practice, is the median vein of the elbow. It is preferable to use the left arm, as any temporary inconvenience is then of less significance. The donor should be recumbent and comfortable, lying well to the operator's side of a couch with the arm supported on a small table of suitable height.

Sterilization of the skin is adequately achieved by the use of iodine, or better, the acetone-"Cyllin"-methyl alcohol solution, which does not spoil the visibility of the veins. After this the skin should be swabbed over with some of the citrate solution, as small amounts of such antiseptics are very powerful blood coagulants. The operator's fingers should receive similar attention. The actual taking of the blood may be performed by direct incision into a superficial vein, by cutting down upon and cannulizing it, or (and this is the method of preference) by the use of a wide-bored needle. It is a very uncommon event that blood cannot be obtained by the use of a needle, but should it arise, cannulization can be performed exactly as is described below in connexion with the giving of blood. Success in the use of the needle demands close adherence to a satisfactory technique. The needle must be of adequate size and of short length. A diameter of at least two millimetres is necessary and the bevel should be obtuse while the needle is sharp, and thoroughly clean and bright inside and out. The injection of a local anaesthetic has been found most helpful. This is given through a single intradermal wheal in the shape of a broad arrow-head pointing proximally. This gives a satisfactory small area of anaesthesia below, and if a 2% solution of "Novocain" (or "Ethocaine") is employed, the amount necessary does not in the least obscure the vein. The method of injection is shown in Figure I. With a tenotome or small scalpel a skin puncture is now made, just large enough to admit the needle with ease. The needle is now rinsed in citrate solution and the requisite amount of warm citrate solution is placed in the receiving vessel. A tourniquet, either a rubber tube or a sphygmomanometer, is placed upon the upper part of the arm at a tension which causes stasis

in the superficial veins without materially affecting the arterial pulse. Dilatation of the veins may be assisted by instructing the donor to clench and unclench his fists slowly and powerfully a few



FIGURE I.

Taking blood by the needle. (a) The vein selected is large and fixed; (b) showing the plan of infiltration and the site of puncture; (c) showing the direction of insertion of the needle.

times. The needle is now thrust distally into the vein, care having been taken that the bevel is towards the skin surface and that the needle is just sufficiently inclined to enter the vein point first. If the technique described is followed, little trouble will be found in carrying out the manoeuvre, for the use of local anaesthesia and a skin puncture remove most of the inherent difficulties.

If all has gone well, the blood will issue in a satisfactory stream, the volume of which may be assisted by the patient's slowly relaxing and contracting the muscles of the forearm. The greatest care must be taken not to move the needle once it has entered the vein. By this method it is usually not difficult to withdraw the maximum of one and a half pints.

The issuing blood should be collected into a sterile vessel in which a suitable amount of citrate solution has been placed, and gently stirred with a sterile rod. It has been the usual practice to employ some such vessel as a glass imperial measure standing in a bowl of warm water, and this provides the essentials of asepsis and the maintenance of temperature.

FIGURE II.  
Showing the relation of vein and incision for cannulization.

It is, however, inelegant and subject to a number of minor accidents. In an effort to overcome this, one of us (C.W.R.) has devised a simple jacketed metal pot (Figure III), which has been made for us by Messrs. Felton, Grimwade. This provides a long spout by means of which the blood can be collected from the tip of the needle, wherever it may lie, a jacket by means of which the blood can be maintained within a very few degrees of body temperature by occasional attention, convenient handles by which the apparatus can be held during the drawing of blood, and five-ounce graduation marks enabling progress to be noted. The use of a short rubber tube leading from the needle to a sterile bottle is also to be recommended. A slight negative pressure may be maintained by a reversed Higginson's syringe (Figure VII). Details of this method have been given by Keynes. It has the advantage of allowing a smaller needle to be used in the case of small veins.



FIGURE III.

The blood kettle described, showing the inner graduated receiving vessel with long collecting spout, and the outer jacketing vessel, which is partly filled with water at 105° F.

#### The Giving of Blood and Saline Solution.

Any method for the introduction of physiological fluids must be such as to permit of the maintenance of strict asepsis and of the proper temperature, to give complete control of the rate of flow, to exclude the accidental entry of air, and to permit of slight positive pressure.

A method of universal applicability and of great simplicity is the cannulization of the vein and the introduction of the fluid under gravity. The simple nature of the procedure renders description unnecessary, but there are one or two points of some importance. The incision should be placed at a definite angle to the vein (Figure II). This gives improved access and precludes the humiliating accident of losing the vein in one wall of the incision. The incision into the vein should also be placed at an angle of 30° to the length of the vein and should about hemitranssect it. This provides a flap which

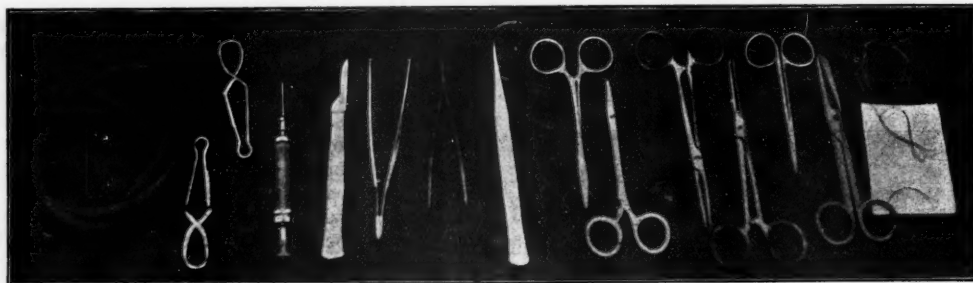


FIGURE IV.  
Showing the maximum equipment for exposing a vein.

can be grasped by fine dissecting forceps, the cannula, with saline solution gently flowing through, being inserted under it with ease. In giving blood, it is convenient to commence with a small amount of normal saline solution, which fills the tubing to the exclusion of air, serves to wash any oozing blood from the wound and does not obscure the manipulations as blood will do. The whole of the necessary instruments for this procedure are shown in Figure IV, and a suitable funnel and cannula in Figure Va. Sometimes, in the case of very small veins, a needle, preferably of the trocar and cannula type (Figure IX), must be substituted for the cannula. It may then be necessary to apply some extra pressure to the inflowing blood. This is readily done by means of the Jubé or Kob two-way syringes, or even by the use in alternation of two or three "Record" syringes with a rubber connexion (Figure V). Very frequently saline and glucose-saline solutions can be given with great ease by the use of a Kauffman's syringe and the gravity funnel (Figure Vb) without an incision.

In an infant the most suitable vein is the great saphenous at its commencement opposite the medial malleolus, owing to its relatively large size and its accessibility. First, the leg should be firmly but comfortably bandaged to a simple splint, then the vein is exposed with the usual technique. The incision

should be eighteen millimetres (three-quarters of an inch) long and made transversely to the long

axis of the leg, with its central point slightly anterior to the middle of the medial malleolus (Figure VI). The use of both a trocar needle and a suitable syringe is advisable. The baby can usually be pacified during the operation by glucose drinks. The whole procedure is surprisingly simple.



FIGURE VI.  
Showing the position of the vein at the medial malleolus and of the incision (dotted).

During the past two years we have had experience of some hundreds of infusions of saline and glucose solutions in infants by way of the superior longitudinal sinus. The giving of blood by this method should not be contemplated. The use of the Kauffman's syringe and gravity we regard as almost a *sine qua non* for the safe employment of this route. The position and angle of entry into the fontanelle, the mode of holding the infant and the general arrangement are shown in Figures VIII, X and XI. The mid-line should be rigidly adhered

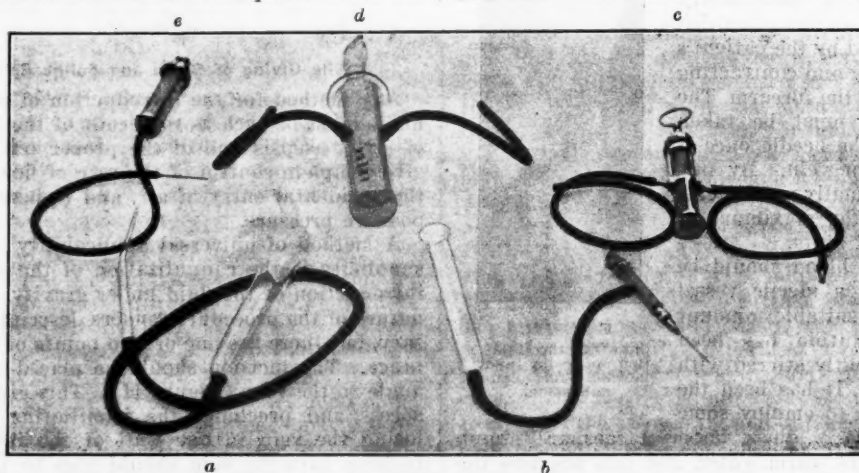


FIGURE V.  
Instruments for the introduction of fluid. (a) Funnel and cannula, with gauze; (b) funnel connected to side-tube of Kauffman syringe with lock-needle; (c) Jubé two-way syringe; (d) Kob two-way syringe; (e) "Record" syringe connected to needle by rubber tube.





FIGURE VII.

The vacuum bottle in water-jacket, with reversed Higginson syringe.

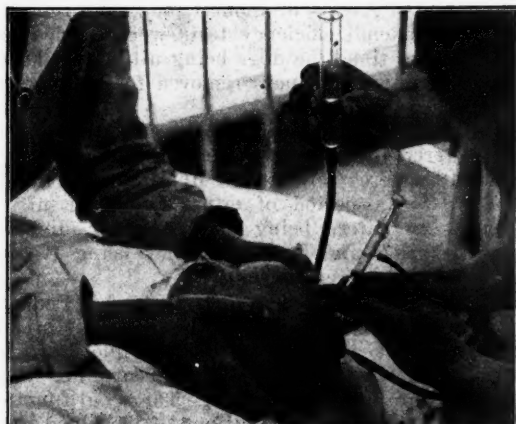


FIGURE VIII.

Showing the introduction of glucose-saline solution into the superior longitudinal sinus by means of the Kauffmann syringe.

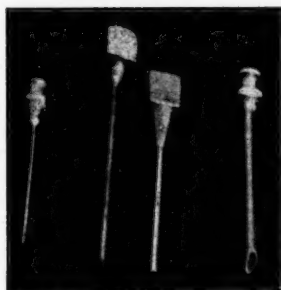


FIGURE IX.

The types of needle used: (a) Hypodermic; (b) needle with trocar; (c) large, short needle for collecting blood.

to and the needle gently inserted till it transgresses the slight resistance offered by the wall of the sinus. This is reached at only a few millimetres under the

skin. If the piston withdraws easily with the free inflow of blood, the point of the needle may confidently be assumed to be in the sinus, and the fluid can then be allowed to flow very slowly in from the funnel *via* the fine rubber tube attached to the lateral inlet of the syringe.



FIGURE X.

Showing the point of entry for the superior longitudinal sinus.



FIGURE XI.

Showing the angle of entry.

#### Summary.

1. A brief historical survey is given, with a word of apology.
2. The spheres of usefulness of the various routes of administration are considered.
3. A few of the indications for intravenous therapy are discussed and reports are given of cases of ruptured viscus, hæmatemesis, hæmophilia, major trauma of limbs, incipient diabetic coma, acidosis from bowel intoxication, and the acute toxæmia of Flexner dysentery with the transmission of malarial disease by transfusion.
4. The use of hypertonic solutions is mentioned.
5. The volume of solutions to be given in various circumstances is discussed.
6. Stress is laid upon the necessity of slow administration, and the signs and treatment of embarrassment are given.
7. Air embolism, agglutination and hæmolysis in transfusion are dealt with.
8. The selection of a donor is discussed with reference to the possibility of auto-transfusion in selected cases, to age, sex and physical condition, and to the amount which may be taken.

9. Agglutination is discussed and the direct and indirect methods of blood typing are described.

10. Citration is considered with reference to the amounts to be used.

11. Methods for the withdrawal of blood from a donor are given, the needle method is preferred, and a new form of receptacle for this is described.

12. Methods for the introduction of blood and saline solutions into patients of every age are given in detail.

#### Acknowledgements.

It is with gratitude that we acknowledge the courtesy of the various honorary physicians and surgeons to the Melbourne Hospital and the Children's Hospital who have permitted us to cite their cases. We have also had the kind assistance of Dr. Lucy M. Bryce and Miss Helen Wischusen in preparing the photographs of agglutination reactions.

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#### EXPERIMENTAL RENAL DISEASE PRODUCED BY X RAYS: LATE RESULTS OF IRRADIATION.

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#### Introduction.

A FAIRLY comprehensive account has been given in previous communications from this laboratory of the anatomical changes in the canine kidney that follow a single direct exposure to X rays of medium wave length and of the progress and nature of the renal insufficiency that follows such irradiation in those cases in which the healthy kidney has been removed. In the first series of experiments a dosage was used which in animals of small and medium size was more than sufficient to overwhelm the kidney completely,<sup>(1)(2)</sup> while in a second series the use of half this dosage resulted in most cases in damage of sublethal degree, varying inversely with the body weight of the dog.<sup>(3)</sup>

The object of the present investigation has been the study of two aspects of the lesion which experiments already reported upon had not completely elucidated. The first of these is the nature of the ultimate anatomical picture following a lethal dosage of X rays, when the untreated kidney has been left *in situ* for a long period, so that changes in its irradiated fellow can reach finality, while the second is the question whether, after the initial acute lesion and subsequent repair that follow a sublethal dosage, any progressive lesion develops.

#### Material and Technique.

The material was supplied by four dogs. Two of these had one kidney delivered on to the loin and exposed to a heavy dosage of X rays, corresponding to about 3,800 r, after which the kidney was replaced and the wound sutured. The non-irradiated kidney was left *in situ* till its irradiated fellow was removed at operation or autopsy. The other two dogs were first subjected to nephrectomy, after which the remaining kidney was delivered, exposed to a dosage of X rays of about 1,900 r, and replaced as before. Renal efficiency tests were carried out from time to time, the dogs being ultimately killed and the irradiated kidneys removed for histological study.

As previously described, the X rays were administered by passing a current of three and a half milliampères through a "Metalix" tube at 112 kilovolts for a period of either thirty or fifteen minutes, no filters being used and the distance between target and exposed kidney being twenty-five centimetres (ten inches).

The tissues were fixed in formalin and in Zenker's fluid, and sections stained with hæmatoxylin and eosin, a modification of Mallory's triple stain for connective tissue,<sup>(4)</sup> picro-indigo-carmin, Van Gieson's stain and Scharlach R. The renal function was estimated by determinations of the blood urea, Andrewes's test and carbon dioxide combining power, while the urine was examined for albumin, urea content and specific gravity, and the daily excretion measured.

#### Experimental Findings.

##### *The End-Result in the Kidney Following a Heavy Dosage of X Rays.*

The latest date at which the changes in the kidney that follow a heavy dosage of X rays have so far been studied is at 230 days after irradiation by Bolliger and Laidley. The dog in question weighed 17.2 kilograms and the irradiated kidney 6.4 grammes, as compared with the 59.0 grammes of its hypertrophied fellow. This kidney, in common with several others examined at various shorter but quite considerable periods after irradiation, showed a markedly fibrosed cortex, containing a few scattered islands of healthy but hypertrophied tubules and large numbers of apparently functioning glomeruli. Only a minority of the glomeruli showed any sclerosis or hyaline change, and in only one or two instances in the series was a completely occluded glomerulus found. In injected specimens the only

ILLUSTRATIONS TO THE ARTICLE BY DR. IAN JEFFREYS WOOD AND DR. C. WALLACE ROSS.

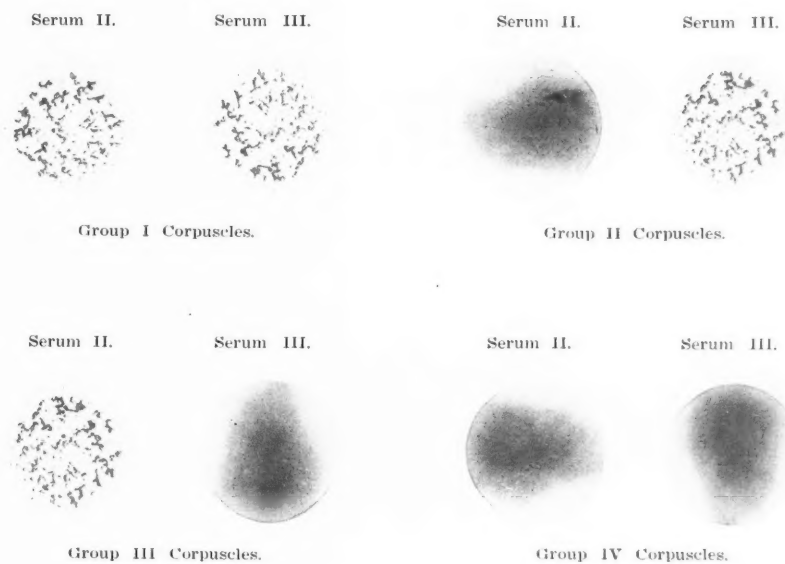


FIGURE XII.

Showing the macroscopic appearances seen in typing blood by the indirect method.



ILLUSTRATIONS TO THE ARTICLE BY DR. M. S. S. EARLAM AND DR. ADOLPH BOLLIGER.

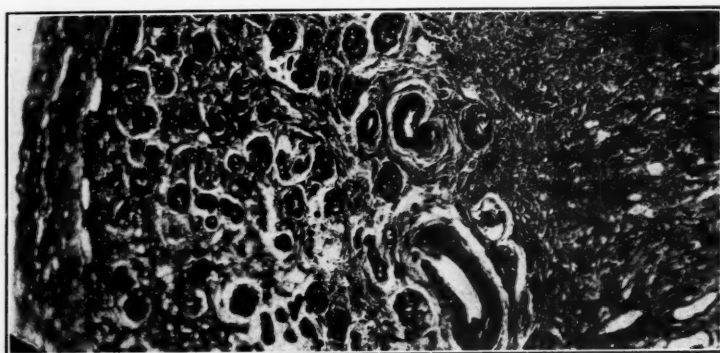


FIGURE II.

Dog A 19. Low-power view of cortex and outer part of medulla, showing large numbers of atrophic glomeruli and medullary fibrosis.

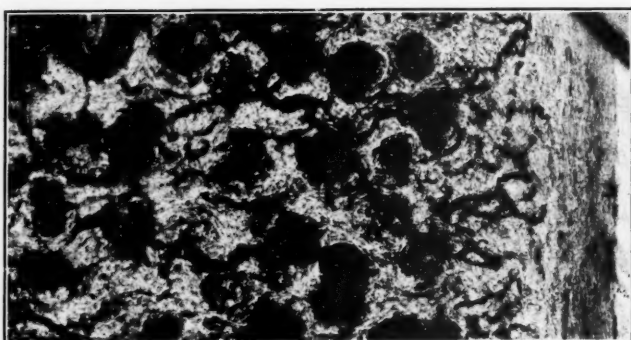


FIGURE IV.

Dog A 74. Renal cortex, injected with India ink.

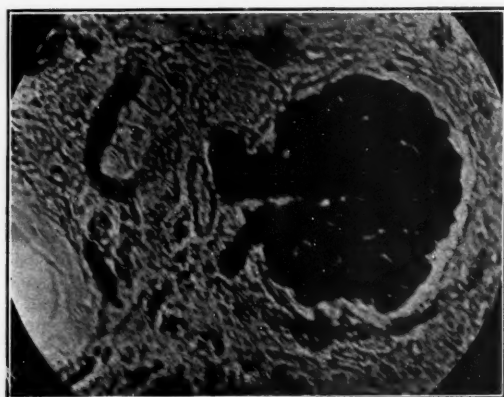


FIGURE V.

Dog A 74. Injected glomerulus, situated in proximity to medulla, showing no apparent abnormality.



FIGURE III.

Dog A 19. Cortico-medullary junction, showing a small group of surviving tubules and several vessels showing marked endarteritis.

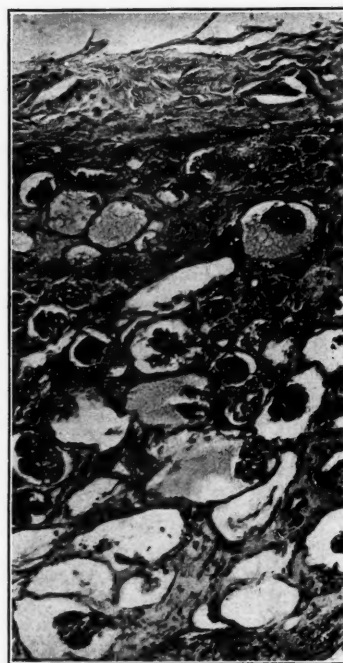


FIGURE VII.

Dog D 17. Sclerotic region of cortex, showing atrophic glomeruli and dilated glomerular capsules.

vascular change of note was tortuosity of the larger vessels, due to shrinkage of the kidney, without obvious structural change.

Further study has been carried out on two dogs.

Dog A 19, weighing 10 kilograms, had one kidney directly subjected to a dosage of 3,800 r. Four hundred and seventy-seven days later the irradiated kidney was surgically removed. It was densely adherent to the surrounding parts and was very small, firm and sclerotic, weighing only 2.1 grammes. On section (Figure I) the cut surface had a greyish-white fibrotic appearance, the cortex appearing slightly darker than the medulla and being relatively more contracted.



FIGURE I.  
Irradiated kidney of dog A 19, with a normal kidney from a dog of corresponding body weight. (Natural size.)

Microscopically the striking feature of the sections was the very marked diminution in the thickness of the cortex, which was reduced to a thin rind of tissue overlying the medulla. Glomeruli could still be identified in large numbers. They were small and atrophic (Figure II), those nearest the surface of the kidney being on the whole more sclerosed than the deeper ones close to the medulla, and in parts merging almost insensibly into the surrounding tissue and being hard to define with accuracy. Concentric fibrosis as seen in human pathological material was not found, and in only a small minority of glomeruli could any thickening of Bowman's capsule be said to exist. In the deeper parts of the cortex dilated glomerular capsules, often containing exudate, were present in fairly large numbers. Though in the majority of glomeruli some indication of the original structure of the tuft was still visible, extensive hyaline change was present in practically all, the nuclei were only a fraction of the number that must have been originally present and, with the exception of some glomeruli in the deeper parts of the cortex, they appeared practically functionless.

For the most part the cortex showed no sign of tubular structure, the tubules having been practically completely obliterated by fibrous tissue that had largely undergone hyalinization, the contraction of which had resulted in apparent crowding together of the less acutely damaged glomeruli. Embedded in the fibrous and hyaline tissue surrounding the glomeruli were large numbers of fatty droplets, originally, as previously pointed out, derived from the tubular epithelium. In a few scattered areas in proximity to the medulla an occasional small group of tubules lined by stunted epithelium was found (Figure

III) in association with the less grossly damaged glomeruli in this situation, and in one or two instances the continuity between the glomerular capsule and the proximal convoluted tubule could still be demonstrated.

The medulla consisted largely of fibrous tissue, with commencing hyalinization in the more peripheral parts. Scattered tubular remnants lined by stunted epithelium were present, sometimes fairly widely distributed, at others only evident towards the apex of the pyramid. The pyramid was covered by a single layer of cuboidal epithelium, while the epithelium of the renal pelvis appeared normal.

The vessels stood out prominently. At the cortico-medullary junction were large numbers of fairly big vessels, of which some, though rendered tortuous by the shrinkage of the kidney, were of normal appearance. The majority of the arteries and arterioles, however, showed a marked thickening of the intima, usually eccentric (Figure III), in which extensive fatty degeneration was often present, while the media in most cases showed well marked hyaline change. In the smaller arterioles the intimal thickening was less obvious. The adventitia, especially of the larger vessels, was in general more abundant than under normal conditions.

The renal capsule was markedly thickened (Figure II), the fibrous tissue, like that within the kidney, in many parts undergoing hyalinization.

Dog A 74, weighing 5.2 kilograms, had one kidney subjected to the same dosage of 3,800 r and was killed seventy-six days later. The irradiated kidney was injected with India ink for the purpose of studying the vascular changes during the sclerotic stage, which, though touched upon by Bolliger and Laidley, have not been described in detail. For the most part the glomeruli were fairly well injected (Figure IV), though in many instances, especially in the smaller and more atrophic glomeruli in the superficial part of the cortex, the injection was only partial, as if the glomerular circulation were obstructed by fibrotic change. Not very much evidence could be seen of the post-glomerular plexus, which had apparently been largely destroyed along with the convoluted tubules. Remnants of this plexus were still present in the cortex corticis in the form of scattered capillary vessels, while in the remainder of the cortex the injection was largely confined to the glomeruli and their afferent arterial supply, the larger trunks of which were rendered tortuous by the shrinkage in size of the kidney.

The appearance in the medulla was relatively normal. Large numbers of straight vessels were injected, pointing to an adequate permeability of the glomeruli in the deeper parts of the cortex. Many of these glomeruli, as also, though to a less extent, of the more superficial ones, presented a remarkably normal appearance (Figure V).

#### *The Anatomical End-Result of a Moderate Dosage and Late Functional Findings.*

Dog D 17, weighing 12 kilograms, was subjected to nephrectomy, ten days after which the remaining kidney was exposed to a dosage of 1,900 r. A snipping taken from the irradiated kidney 282 days later, showed some areas of patchy scarring, in which occasional glomerular fibrosis was found, the remainder of the glomeruli being mostly normal, a minority showing some hyalinization and thickening of Bowman's capsule.<sup>60</sup>

This animal was killed 534 days after irradiation. The irradiated kidney weighed 26.8 grammes, as compared with the 25.6 grammes of its fellow removed before irradiation. The lower part of the convex border was markedly contracted (Figure VI), the cortex in this situation being only one to two millimetres in thickness, while the pyramids appeared fairly normal. The cortex of the upper pole, upper part of the convex border and medial aspect of the lower pole was thickened and apparently hypertrophic.

Microscopically, the sclerosed area presented an appearance very similar to that described in dog A 19, except that there was very little hyalinization (Figure VII). The cortical tubules had been practically replaced by fibrous tissue containing extensive fatty deposits, the glomeruli, often stunted, in dilated Bowman's capsules usually containing exudate, were crowded together, the vessels, which showed only a slight degree of intimal thickening, stood

out prominently at the cortico-medullary junction, and the medulla was markedly fibrosed. The tubules in the outer part of the medulla were dilated, with stunted epithelium, and often contained structureless eosin-staining material, while those deeper in were much reduced in number and compressed by fibrosis.



FIGURE VI.

Irradiated kidneys of dogs D 17 (left of illustration) and D 25. (Natural size.)

The hypertrophic areas showed very occasional patchy scarring, while the tubules all presented a normal appearance. Among the glomeruli, however, hardly any could be classed as perfectly normal. The large majority showed a thick, structureless, apparently hyalinized Bowman's capsule, staining bright red with the Mallory stain, a fair number of glomeruli showed hyaline change, and occasionally there was an exudate into the glomerular capsule or a few adhesions between capsule and glomerulus. Glomerular changes were more constant and more advanced than in the snipping taken from this kidney 252 days previously. The blood vessels showed no obvious change.

Dog D 25, weighing 14 kilograms, had nephrectomy performed, and nine days later the remaining kidney was subjected to a dosage of 1,900 r. A snipping from this kidney at 285 days showed the same findings as in dog D 17 at this stage. Five hundred and nineteen days after irradiation the animal was killed.

The irradiated kidney weighed 49.6 grammes, as compared with the 34.2 grammes of its normal fellow, previously removed. Macroscopically (Figure VI), the only abnormality was a depressed scar at the junction of the lower and middle thirds of the convex border.

Microscopically, the cortex showed an occasional area of patchy scarring, and the tubules were healthy, but the glomeruli, as in dog D 17, were almost uniformly definitely abnormal. The most striking feature, and much more constant than in the other animal in question, was thickening and hyalinization of Bowman's capsule, which was present in practically every glomerulus examined. The glomeruli themselves showed occasional atrophic change, more particularly when the glomerulus concerned was involved in a scarred area, hyalinization and adhesions to Bowman's capsule. The blood vessels showed no abnormality.

#### Functional Findings.

For about the first half of the period under consideration the functional findings have already been described.<sup>(3)</sup>

Dog D 17 at first made little attempt at recovery from the nitrogenous retention and polyuria that followed the

irradiation. At 87 days the blood urea was still 144 milligrammes per centum, and the twenty-four hours' excretion 950 cubic centimetres of urine containing 1.9% of urea. The blood urea reached a maximum value of 267 milligrammes per centum at 217 days, but from this point recovery was steady and the dog was soon in excellent clinical condition, with a blood urea fluctuating round 100 milligrammes and a twenty-four hours' urine excretion of 300 to 500 cubic centimetres containing 3% to 4% urea and a small amount of albumin. At death at 534 days the dog was in excellent physical condition, with a blood urea of 69 milligrammes.

Dog D 25 was relatively little affected by the irradiation, the blood urea reaching a maximum value of 147 milligrammes per centum on the thirty-ninth day. The animal remained consistently in excellent clinical condition, the blood urea ranging mostly from 40 to 60 milligrammes and the twenty-four hours' urine excretion being usually below 500 cubic centimetres, with a urea content from 2% to 4.5%, containing, however, very heavy albumin on every occasion examined, up to 2.5 grammes per litre. At death the blood urea was 47 milligrammes per centum and the urea content of the urine 8.1%.

Occasional estimations of the carbon dioxide combining power of the plasma of these two dogs showed a marked fall during the acute stage of the renal insufficiency, followed by reversion towards normal as recovery took place. The Andrewes reaction of dog D 17 was positive at 231 and 236 days after irradiation, the blood urea on these occasions being 195 and 130 milligrammes per centum respectively. On all of many other occasions the reaction was not obtained, as happened consistently with dog D 25.

Post mortem examination showed no sign of cardiac hypertrophy in either of these two dogs.

#### Discussion.

##### Late Findings After a Heavy Dosage of X Rays.

The most striking feature of the sections of the irradiated kidney of dog A 19, examined at 477 days, was the almost complete failure of the cortex to stain with any of the three fibrous tissue stains used, the staining being bright red with Mallory's stain, exactly as described by Wolff<sup>(5)</sup> in the case of the *tunica elastica* of the larger arteries, yellow with Van Gieson's stain and pale green with picro-indigo-carmin. Apparently this was the result of widespread hyaline change. Though reexamination of several of the irradiated kidneys previously reported upon showed this change commencing, it was not at all extensive, and the picture up to 230 days was essentially one of normal glomeruli surrounded by fibrous tissue. The end-result as now seen follows quite naturally. Sclerosis gradually reaches its maximum, the fibrous tissue which has replaced the destroyed tubules gradually becomes hyalinized, the undamaged glomeruli, prevented by the surrounding fibrosis from exercising their normal function, undergo atrophy and hyalinization, and the larger vessels, which now serve no useful function, undergo proliferative endarteritis, as they do elsewhere in the body when the necessity for their continued patency no longer exists. The entire kidney becomes to all intents and purposes an inert mass of fibrous and hyaline tissue.

##### The Late Results of a Moderate Dosage of X Rays.

The main object in studying dogs D 17 and D 25 over such a long period of time was to discover whether or not any chronic change, apart from the fibrosis secondary to acute cortical damage, might be initiated by a moderate dosage of irradiation.



Thickening and hyalinization of Bowman's capsule, definitely in excess of any such change observed at earlier periods, was an almost constant feature in both dogs, but apart from this feature no histological finding was encountered that had not been observed in equal degree at a much earlier stage. The areas of cortex unaffected by fibrosis showed no degenerative change, the tubules were healthy, there was no evidence of any generalized fibrosis, and the vessels were normal. Moreover, after recovery from the acute renal lesion that followed irradiation, frequent renal efficiency tests furnished no evidence whatever of any progressive kidney insufficiency, *post mortem* examination revealed no sign of cardiac hypertrophy in either dog, and both remained in perfect physical condition till they were killed. Albuminuria was present in both, but is hardly evidence of a progressive renal lesion, as it is well known to occur after experimental reduction of the kidney tissue. Apparently the ultimate result of a single direct exposure of the kidney to a moderate dosage of X rays, once healing from the acute lesion has taken place, is comparable rather with the result of an excision experiment, in which a portion of the kidney tissue has been removed, than with a chronic nephritis.

#### Conclusions.

1. The fibrous tissue replacing the cortical tubular necrosis produced by exposure of the kidney to a single heavy dosage of X rays eventually undergoes hyaline change, while the glomeruli, apparently undamaged by the actual irradiation, undergo atrophy and hyaline change.

2. After recovery has occurred from the acute renal lesion that follows exposure of one kidney to a sublethal dosage of X rays, the opposite kidney having been removed, there ensues an indefinitely prolonged period of histological and functional stabilization in which, apart from hyalinization of Bowman's capsule, no late progressive or degenerative lesion of the surviving renal parenchyma develops.

#### Acknowledgements.

We should like to express our very sincere thanks to Professor C. Witherington Stump and to the technical staff of the Department of Anatomy, University of Sydney, for the preparation of the photomicrographs.

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#### A NOTE ON THE DISAPPEARANCE OF THE MITOTIC PHASES FROM IRRADIATED TISSUE CULTURES.

By WM. H. LOVE, B.Sc., Ph.D.

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REGARDING the disappearance of mitotic figures from irradiated tissues, it is believed by some that the cell is most sensitive to radiation during the mitotic period, and that consequently a destruction of cells takes place, whilst actually passing through mitosis. Others believe that the sensitive phase is premitotic and that a cell in mitosis is relatively resistant to radiation. According to this latter hypothesis the decrease in the number of mitoses in an irradiated tissue culture is due to the fact that the cells are actually inhibited by the radiation from entering mitosis.

I have already made a study of this problem<sup>(1)</sup> and have arrived at the conclusion that, for tissue cultures, the sensitive phase is premitotic. The object of this note is to present further independent evidence in support of this conclusion.

In 1930 Kemp and Juul<sup>(2)</sup> made an experimental study relating to the disappearance of the mitotic phases from irradiated tissue cultures. I have made an analysis of this problem, based on the hypothesis that the disappearance of mitoses from these tissue cultures is due to inhibition, and not due to disintegration. The similarity between the analytical and experimental results is very striking.

#### Analysis.

It has already been shown<sup>(1)</sup> that, under certain conditions, the number of cells entering mitosis per unit of time in normal tissue cultures is constant

$$\frac{dN}{dt}$$

If now we let

- $t_1$  = the average duration of prophase
- $t_2$  = the average duration of metaphase
- $t_3$  = the average duration of anaphase
- $t_4$  = the average duration of telophase
- $T_1$  = the average duration of mitosis

we may immediately formulate the following results.

$$T_1 = \sum_{r=1}^4 t_r$$

$$n_1 = \left( \frac{dN}{dt} \right) t_1$$

$$n_2 = \left( \frac{dN}{dt} \right) t_2$$

et cetera

$$\text{and } \sum_{r=1}^4 n_r = \left( \frac{dN}{dt} \right) T_1$$

where  $n_1$ ,  $n_2$ ,  $n_3$ , and  $n_4$  represent the number of cells in prophase, in metaphase, in anaphase, and in telophase, respectively.

If the diminution in the number of mitoses in an irradiated tissue culture is due to the inhibition of a proportion of those cells which normally would have entered mitosis during the period corresponding to

the irradiation, then, after the administration of a dose, just sufficient to insure the disappearance of all the phases of mitosis, the disappearance of the various phases will be represented by the equations

$$n_{t_1} = n_1 \left(1 - \frac{t}{t_1}\right)$$

*et cetera*

in which  $n_{t_1}$  represents the number of cells in prophase calculated at time  $t$  after the commencement of the diminution in the prophase figures; it is supposed that the time of administration of the dose of radiation is small.

The diminution in the number of cells in mitosis will be represented by

$$\sum_{r=1}^4 n_{tr} = \sum_{r=1}^4 n_r \left(1 - \frac{t}{\sum_{r=1}^4 t_r}\right)$$

Thus we may write

$$\frac{d}{dt} \left( \frac{n_{t_1}}{n_1} \right) = - \frac{1}{t_1}$$

$$\frac{d}{dt} \left( \frac{\sum_{r=1}^4 n_{tr}}{\sum_{r=1}^4 n_r} \right) = - \frac{1}{T_1}$$

These results may be represented diagrammatically as in Figure I.

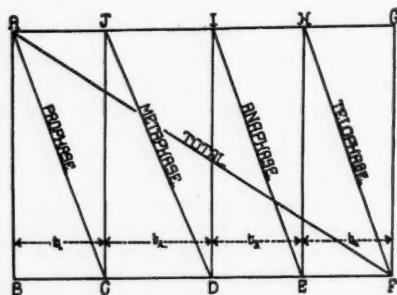


FIGURE I.

If we plot the percentage of cells in the various stages of mitosis along the line AB, and the time of observation (after the irradiation) along the line BF, and if the distances BC, CD *et cetera* represent the average duration of prophase, metaphase *et cetera*, we see that the diminution in the number of the various phases of mitosis is represented by the lines AC, JD, IE and HF. The diminution in the total number of mitoses is represented by the line AF.

This analytical result bears a striking resemblance to the experimentally determined curves of Kemp and Juul, and we thus have a further piece of evidence in support of the theory of inhibition.

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#### THE FREQUENCY OF PLEURITIC ADHESIONS.

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FOR nearly two years I have been making a special note in my summaries of *post mortem* examinations as to the presence or absence of pleuritic adhesions. Notes are now available of 300 cases, 250 of these having been at the Adelaide Hospital and 50 at the Mental Hospital at Parkside. I have been surprised at the frequency with which such adhesions are found. It will be seen that in over three-fourths of the bodies coming to *post mortem* examination pleuritic adhesions are present, the number showing this condition necessarily increasing with age. It will be seen also that a high incidence of adhesions is found as early as before the thirtieth year.

In considering what constituted adhesions it was decided that any tag, however insignificant, uniting the visceral to the parietal pleura, must be included. I have also included four cases in which a sticky exudate alone was present, the inflammatory condition being still in its acute stage. In these cases, though adhesions had not yet formed, it is almost certain that they would have appeared if the patient had recovered from the illness. These cases are of some interest. In one, a woman, aged fifty-five years, the sticky exudate was associated with caseation in bronchial and tracheal glands and lymphatic extension to the lung. The other three cases were all *Staphylococcus aureus* infections with abscesses in the lungs in two and along the dorsal vertebrae in the other. Adhesions between the lobes are included, even in the absence of parietal adhesions.

The association of pleuritic adhesions with pulmonary tuberculosis is important. There were 30 patients in whose lungs tuberculous lesions were present, either extensive or slight. In 29 of these pleuritic adhesions were present. In one case there were no adhesions; the body was that of a woman of twenty-one years, who had caseous foci in the tracheal and right bronchial glands and a small old tuberculous process near the apex of the right lung. Several examples occurred in which there were tuberculous lesions elsewhere, though none obvious in the lung, and in which there were no pleuritic adhesions. Such a condition, for example, was seen in one man of thirty-eight, one of fifty, and one of seventy-five years.

The results have been tabulated (Table I) in decennial age periods and grouped according to the sexes. The few figures suggest that before the age of twenty pleuritic adhesions are found only occasionally. After that age they appear to be frequent. However, even in the age group 70 to 79 in men, there were 5 cases out of 38 in which no adhesions were seen. In the preceding age group, 60 to 69, 7 out of 53 men were free from adhesions, and 4 women out of 15.

The frequency of pleuritic adhesions raises an interesting question. It is perfectly clear that these

TABLE I.

*Three Hundred Patients With and Without Pleural Adhesions. Tabulated in Decennial Age Periods.*

	Age (in years).											Total.
	Under 10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	Not known.	
<b>Males—</b>												
Adhesions present .....	0	0	8	13	17	27	46	33	7	0	1	152
None .....	1	3	5	2	6	12	7	5	0	0	0	41
<b>Females—</b>												
Adhesions present .....	0	1	13	9	15	20	11	7	2	1	1	80
None .....	0	6	7	2	4	4	4	0	0	0	0	27
Total of those with adhesions	0	1	21	22	32	47	57	40	9	1	2	232 (77.3%)
Total patients .....	1	10	33	26	42	63	68	45	9	1	2	300

TABLE II.

*The Extent of the Adhesions in 224 Cases in which they were present.*

Universal or almost so.	Extensive.	Moderate.	Slight.	Trifling.	Recent Exudate or Sticky Lymph Only.
15	49	78	70	8	4

adhesions are not due solely, or even chiefly, to pulmonary tuberculosis. With one exception it is true that all patients with pulmonary tuberculosis also had pleuritic adhesions, but these only form a small proportion of the total number with adhesions. Some persons, with obvious and usually old tuberculous lesions elsewhere than in the lungs, were free from adhesions. Clearly some other cause is operative and responsible for the majority of the adhesions. What is this cause?

It seems unlikely that many of these patients can have suffered from lobar pneumonia, or even from bronchopneumonia, which is more or less incapacitating. Very often in the previous history, as given in the hospital, there is no mention of any previous serious chest lesions. A study of Table I would suggest that between the ages of twenty and thirty persons are particularly apt to suffer from some condition in the lungs which gives rise eventually to these adhesions. It seems probable that the catarrhal colds that are so frequent in the community may be the responsible agents concerned, giving rise perhaps to small areas of bronchopneumonia more frequently than we realize. It would seem as though the condition resulting in the formation of adhesions was often not associated with any very definite symptoms that had impressed themselves upon the patient's mind. However, some indefinite and perhaps stabbing pain, slight in nature and associated with a heavy "cold", may have been experienced and been forgotten. In a few cases, of course, apart from the tuberculous ones, the pleural adhesions are due to some graver condition, such as malignancy or a hydatid cyst.

Table II shows the extent of the adhesions when present. It will be seen from this that in 142 out of the 300 persons (nearly half), adhesions were

present which were more than slight and could be described as moderate to extensive. During the process of their formation surely some symptoms must have been manifested.

## Reports of Cases.

### RENAL TUBERCULOSIS.

By J. BURTON CLELAND, M.D.,

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DR. F. W. D. COLLIER, in THE MEDICAL JOURNAL OF AUSTRALIA of February 28, 1931, published an interesting article on his experiences of renal tuberculosis in Australia. He states that in London in 3% of all *post mortem* examinations renal tuberculosis is seen and that one-third of all kidney infections are tuberculous. In America 1% to 3% of autopsies reveal renal tuberculosis. In Australia he thought that the figures must be much lower. He had seen at the Newcastle Hospital only three cases of proved renal tuberculosis in 796 admissions for surgical genito-urinary conditions, of which 351 were kidney infections. He adds that there were only 22 deaths from the condition in New South Wales during the past two years. He had been able to recognize renal tuberculosis in only six instances during the past five years in over 750 cystoscopic examinations.

I have looked up in my tabulated results of *post mortem* examinations already published, or about to be published, in *The Medical and Scientific Archives of the Adelaide Hospital*, the number of examples of renal tuberculosis met with in 2,000 autopsies. In the first thousand there are six cases, and in the second thousand eight, which works out at 0.7%. The following epitome of these cases will show the age and sex of the individuals, together with the associated tuberculous lesions and other pathological conditions:

4/25.—Male, aged fifty-three years. Pontine hæmorrhage. Old tuberculosis of hip, kidney, hilar glands.

171/24.—Male, aged thirteen years. Bilateral tuberculous pyelitis and nephritis. Secondary tuberculous peritonitis.



Injury to urethra with hæmorrhage into pelvic tissues and extravasation of urine from cystoscopy. Interstitial emphysema of lungs.

174/24.—Male, aged forty-three. Double tuberculous pyonephrosis. Tuberculosis of prostate. Uræmia (surgical type). Slight bronchopneumonia.

20/22.—Male (elderly). Small tuberculous glands in mesentery. Tuberculous pyonephrosis. Caseous areas in prostate, epididymis.

33/28.—Male, aged seventy-eight. Tuberculosis of left kidney and suprarenal. Secondary tuberculous peritonitis with ascites.

190/21.—Male, aged thirty-nine. Tuberculous meningitis. Racemose tuberculous of lungs. Tuberculosis of prostate, glands in pelvis, retroperitoneum and mediastinum, and hilum of right kidney.

171/26, male, aged thirty. Hypertrophied and dilated heart, probably from essential hyperpiesis. Thromboses in left subclavian and (small) apex of left ventricle. Infarcts in lungs. Chronic venous congestion of liver, spleen. Tuberculosis of kidneys (early in one). Tuberculosis of vesiculæ. Healed tuberculosis of hip. Inspissated cold abscess (?) from neck. Healed duodenal ulcers. Chronic ulcer (?) tuberculous of ascending colon. Infective ulcers of penis.

208/28.—Male, aged thirty-nine. Pulmonary tuberculosis with some cavitation and a good deal of fibrosis. Tuberculous laryngitis. Slight tuberculous ulceration of intestine. Caseated tuberculosis of left kidney and in epididymis on each side. Large caseated mass in prostate and vesiculæ seminales. Four tuberculous ulcers of bladder. (Wassermann negative.)

66/29.—Male, aged twenty-four. Extensive tuberculosis of vesiculæ seminales with thick green pus. Secondary spread to both kidneys (? ascending) with miliary tubercles and caseous streaks (as in abscesses of surgical kidney). Intense miliary tuberculosis of lungs. Caseous tuberculosis of left bronchial glands. Tuberculous meningitis.

80/26.—Male, aged sixteen. General peritonitis, secondary to tuberculous pyonephrosis. Pale kidneys. Tuberculous foci in lung.

41/27.—Male, aged twenty. Peritoneal tuberculosis (nodules). Extensive racemose pulmonary tuberculosis. Tuberculous ulcers of intestine. Recent adhesive-hæmorrhagic tuberculous (?) pericarditis. Tuberculous (?) foci in kidney. Purulent vesiculæ seminales.

219/27.—Male, aged twenty-two. Caseous tuberculous focus in right kidney. Tuberculous meningitis. Small tuberculous (?) ulcer in ileum. Some tubercles in lungs. Red hepatization in one lung. *Synechia pericardii*. (Wassermann negative.)

131/28.—Female, aged fifty-eight. Tuberculous caries of a lumbar vertebra with abscess, latter infected from colon, between spleen and left kidney. Tuberculous left kidney with secondary infection. Adhesions between rectum and uterus, with an abscess cavity and hypertrophy of rectal wall above. Mucopyometra. Small ulcers of ileum. Old tuberculous foci in lungs. Irregular fine cirrhosis of liver.

176/28.—Female, aged sixty. Lobar pneumonia in both lungs; in one grey hepatization, probably passing into diffuse purulent infiltration, pleurisy and pericarditis. Purulent otitis media. Old tuberculous lesion in one kidney. Thyroid small.

Of the 14 cases, 12 occurred in males; the ages varied from thirteen to seventy-eight. A number of the patients were under thirty. In six of the 14 cases there were tuberculous lesions in the prostate or vesiculæ seminales. In two cases the tuberculous lesion had spread to the peritoneal cavity and given rise to tuberculous peritonitis; and in another instance an ordinary purulent peritonitis had developed as a secondary condition.

In examining the tabulated results of all tuberculous cases it is seen that tuberculosis of the prostate may occur alone, or associated with tuberculosis of the kidney or of the epididymis or of both.

Dr. Collier suggests that renal tuberculosis is always secondary to a lesion elsewhere. He says that the real primary focus is in the lungs, mesenteric glands or bone, and is usually old, quiescent, and hard to find. In looking

through the above list of fourteen examples of renal tuberculosis, it will be seen that one, an old lesion in a woman of sixty (Number 176/28), the tuberculous lesion was old and there was none elsewhere. In only two cases (Numbers 41/27 and 208/28) was the condition associated with ordinary extensive pulmonary tuberculosis, though miliary tuberculosis was present in several as a late extension. It will be seen that in thirteen out of the fourteen cases tuberculous lesions occurred elsewhere as well as in the kidney, and these other lesions were often of old standing. At first sight this might seem to support almost absolutely Dr. Collier's statement that the real primary focus is elsewhere than in the kidney. I do not think, however, that this is necessarily the case. The other lesions may be just as likely to be secondary to the kidney lesion as *vice versa*. We must remember that under ordinary circumstances tubercle bacilli gain entrance through the oral cavity, the respiratory tree, or the intestinal mucosa through being engulfed by phagocytic cells which carry the bacilli through the mucous membrane into the lymphatic spaces. Very rarely is a primary tuberculous lesion seen on the mucosal surface itself. What happens after the bacilli have entered the lymphatics depends upon whether the ingesting cell only travels a short distance before it is overcome by the tubercle bacilli that it is carrying, or whether by good fortune it is able to travel far afield, reach the thoracic duct and enter the blood stream. If the bacillus-laden cell is held up early, as may be the case if it is quickly rendered sick by its multiplying burden of living organisms, it will be arrested in the lymphatic glands draining the area of entrance—the glands in the neck, for instance, or in the mesentery. If it enters the blood stream, it may come to rest in almost any organ or tissue, amongst these being the kidney, epididymis, bone, brain *et cetera*. If several cells containing tubercle bacilli escape into the circulation about the same time from the same source of infection, they may get stowed away eventually in different parts, and we may have several separate primary lesions all of about the same age. On the other hand, once a tuberculous focus has been established, it is quite likely that cells containing tubercle bacilli may escape from the lesion, finally enter the blood stream, and so give rise to secondary foci. This method of spread, by being ingested by cells, is quite different from the erosion of a tuberculous focus into a blood vessel and the miliary seeding that follows.

#### PINK DISEASE.

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T.G., a male, aged three months, was brought to the Children's Hospital, Melbourne, in October, 1931, because of irritability and refusal of the breast. He was the first child of a healthy mother and had been delivered with instruments at full term. He was entirely breast fed, and for the first three months was a normal healthy baby. From then on he became irritable and began to refuse his food. At three and a half months he began to sleep in the prone position with his face buried in the bed-clothes; but at this stage there was otherwise no apparent photophobia. Gradually the typical picture of pink disease developed and he was admitted to the ward during his fifth month, but, as is the custom, he was discharged as soon as possible.

When the child reached the age of six months, the disease was at its height, the child being intensely irritable and sleepless, with pink, cold hands and feet, hypotonia, sweating, and a generalized sudaminal rash. His photophobia was now the most pronounced feature, and there were continuous blinking and profuse lachrymation.

At this stage the mother attended the Eye and Ear Hospital, having developed in her own eyes a condition similar to that in the child's. It was not known at the Eye and Ear Hospital that her child had pink disease, and no special notice was taken of her condition. It was labelled conjunctivitis, although note was made of profuse lachrymation and of the absence of redness—two unusual

features of the common forms of conjunctivitis. Treatment was of little avail. She says that her eyes were exactly similar to the child's in every way, and the condition spontaneously cleared up in about three weeks.

At the age of eight months the child began to improve, and at nine months he was completely normal once more.

#### Discussion.

This case is reported for three reasons.

1. *The Age.* Three months is the earliest age of onset yet recorded. The youngest patient in Dr. Jeffreys Wood's series was four months old; other observers also quote four months as the earliest age.

2. *The Question of Infectivity.* Jeffreys Wood reported two cases in one family, Dickson observed the disease in two cousins living in the same house at Rushworth, and Shugg has reported two cases in one family from Tasmania. Certainly this child had been affected for three months before the mother developed any eye symptoms, so that the evidence is admittedly very indefinite; but it is possible that her so-called conjunctivitis and the photophobia of the child, so typical of pink disease, were due to one and the same cause.

3. *The Question of Etiology.* The case seems to refute the theory that the disease is an avitaminosis, occurring as it did so early in the breast-fed baby of a healthy woman, herself living on a good mixed diet and in good home circumstances. Both before and during the entire course of the disease the diet of both mother and child remained unaltered.

#### Acknowledgement.

I must thank Dr. W. W. McLaren for permission to publish this case.

#### A STRIKING GENERAL REACTION TO A BEE STING.

By EDWARD DERRICK, M.D.,  
Mount Mulligan, North Queensland.

This case report is inspired by Professor J. B. Cleland's article, "Insects in Their Relationship to Injury and Disease in Man in Australia", in the journal of December 5, 1931, page 711.

A young man of nineteen, just getting about again after a fracture of the tibia and fibula, but otherwise quite well, was stung by a bee about 2.5 centimetres (an inch) behind the left mastoid process. The sting was promptly removed. Within two minutes the eyes became itchy, then all the scalp became itchy, and the face was noticed to be flushed and the eyes bloodshot. Then the shoulders were noticed to be goose-fleshed. Next, the shoulders, arms, chest, abdomen and legs became very red, and the patient felt warm all over. The itch passed off as the flush developed. At about ten minutes from the time of the sting he shivered, trembled and felt anxious.

On examination at fifteen minutes there was a brilliant erythema everywhere. There was a swelling the size of a shilling at the site of the sting, otherwise no urticaria. The pulse rate was 90. The heart appeared to be acting normally. At twenty-five minutes the flush began to fade from the arms, and at thirty-five minutes had completely disappeared; so also had the local reaction.

This man had often been stung before, but never with any but local symptoms. In contrast to Dr. Gilbert Brown's patient, he had no faintness, nausea, or any serious symptom. Indeed, at the height of the reaction he assured me that he felt in himself perfectly fit, except for the anxiety. One assumes that the bee in this case administered its toxin intravenously.

### Reviews.

#### KIDNEY DISEASE AND ARTERIAL TENSION.

DR. A. M. FISHBERG has already had to bring out a second edition of his very successful text book, "Hypertension and

Nephritis", and has seized the opportunity to rewrite and expand much of it, though there is very little increase in bulk.<sup>1</sup>

Thus the first chapter on impairment of renal function contains a discussion of the mechanism of acidosis production in renal failure, a process of some complexity.

In the section on urinary tests Dr. Fishberg still holds to the simplest—the phenolphthalein and other excretory tests are mentioned—but he prefers the simple urea concentration and the concentrating measurement shown by specific gravity.

Of the combined clinical blood and urine tests Amberg's formula is completely rejected. McLean's is given in full, while the Addis ratio and the blood urea clearance are considered at full length. He ends by writing: "If renal function is impaired the simple concentration test will reveal it"; while in blood chemistry he wants no more than blood urea or non-protein nitrogen at most.

The chapter on oedema has been rewritten, the various theories are considered and the three essentially different types of oedema are recognized: cardiac, nephrotic and nephritic. Starling's theory of oedema as being due to fall in osmotic pressure through diminution in blood proteins is stressed as the basal factor in nephrotic oedema, though not in the cardiac or nephritic forms.

He quotes only Leiter's earlier work; the important work of Leiter and of Shelburne and Egloff has appeared later. These workers, by bleeding animals (dogs and monkeys), separating off the red cells, suspending these in Locke's solution and reinjecting the suspension, were able to reduce the blood proteins without endangering the animals' lives. By this a certain degree of oedema could be produced at will, and increased or diminished by diet and the use of sodium chloride, the most important point of all being the reduction of the blood proteins to 3%, at which point oedema always appeared. This oedema was of the low-protein nephrotic nature. All these authors, Leiter especially, are careful to disclaim having produced anything more than an oedema; other features of nephrosis, hypercholesterolemia especially, did not appear. This type of oedema is seen in pure nephrosis, the nephrotic type of chronic glomerulo-nephritis, the oedema of the amyloid kidney and hunger oedema.

There is very little new in the treatment of oedema, but the possibility of the occurrence of all these forms together is not forgotten.

The chapter on uræmia, unchanged except in one or two minor points, is still one of the best in the book. Here clinical experience walks hand in hand with laboratory research, and the procedures are based on rational pathology.

The italics are retained in the statement that "there is no convincing evidence of any difference between the various protein foods as regards nephro-toxic action or liability to produce uræmic symptoms in a patient with impaired renal function".

There is little change generally in the chapters on hypertension. The work of Hernig on the carotid sinus in connexion with disturbance of circulatory correlation is discussed, but Fishberg doubts whether it is analogous to the mechanism of hypertension in man; for, as he points out, "the function of the blood pressure restrainers is intact in the hypertensive patient".

He again insists on the importance of hypertension of renal origin and argues strongly for the compensatory nature of such hypertension; he points out that as the glomerular filter area diminishes, so does the blood pressure rise.

For the existence of the hypothetical pressor substance he can find no evidence. At the same time he freely admits the existence of a hypertension in which there is no evidence of renal change—essential hypertension.

The chapter on hypertensive retinitis has been completely rewritten and is now headed "Hypertensive Retinopathy". It is subdivided into three parts: (i) "Hypertensive Neuro-retinopathy", (ii) "Arteriosclerotic Retinopathy", (iii) "Choked Disc due to Cerebral Oedema and Intracranial Pressure".

<sup>1</sup> "Hypertension and Nephritis", by A. M. Fishberg, M.D.: Second Edition, 1931. London: Baillière, Tindall and Cox. Royal 8vo., pp. 620, with illustrations. Price: 30s. net.

The discussion and differentiation between the first two of these conditions are detailed and much helped by some very interesting retinal photographs, showing the points in difference.

It is only fair to state that many ophthalmologists do not accept many of the distinctions laid down (mostly after Foster Moore) nor do they accept (Allbutt certainly did not) Volhard's theory of angiospasm for the production of these conditions. However, the chapter cannot be summarized and deserves most careful study. In regard to choked disk in cerebral oedema, there is less difference of opinion; a pure form is seen in the raised cerebral pressure associated with plumbic encephalopathy.

Dr. Fishberg in classification of renal conditions retains his former adaptation of Volhard and Fahr's and will have none of the later schemes of Addis or Christian.

The chapter on nephrosis is largely rewritten. The earlier experiments of Leiter are quoted, but not his later work, nor that of Shelburne and Egloff. If anything, he inclines to Epstein's conception of nephrosis as a purely metabolic disturbance. His difficulty, of course, occurs in separating pure nephrosis from the nephrotic form of chronic glomerulo-nephritis, a difficulty in which he is in company with Van Slyke, Addis and Christian. It is this classification which makes the chapter on chronic glomerulo-nephritis rather difficult to read, as the two forms are discussed together, whereas the differences between them are as great as possible.

There is also confusion arising from the fact that many cases beginning as malignant hypertension, may, in the end, be indistinguishable in function and structure from hypertensive chronic nephritis. As the author himself states, "the definition of essential hypertension" (of which malignant hypertension constitutes a subdivision) "by exclusion is a confession of ignorance and probably the condition is merely a collective concept for a number of conditions having in common the positive characteristics of arterial hypertension and the negative one of absence of primary renal disease". This does not prevent the chapters that follow from being as complete and satisfying as possible, with a series of excellent illustrations.

The only new feature in aetiology which is discussed is the paroxysmal hypertension occasionally seen in patients suffering from suprarenal tumours.

Of the treatment of the actual condition there is little new; sulphocyanate, watermelon seed, liver extract, and protein shock are mentioned only to be condemned, and Allen's hopeful work on chloride restriction seems to have led to nothing.

Summing up, this edition has brought up to date a book which is a model of its kind. Excellently written, clear, concise but complete, covering every possible aspect of the subject, it should become the standard work upon this very difficult question.

### CONSCIOUSNESS.

IN "The Neural Energy Constant" Dr. John Bostock has launched a new psycho-physical theory.<sup>1</sup> The essay is introduced by the author as a preliminary communication.

The thesis is presented in an evolutionary setting and may be summarized as follows. Mind and protoplasm are one entity. Vague states of cognition and conation are conceded to unicellular organisms under the terms "awareness" and "urge to adjust" respectively. In higher forms of life these faculties are delegated to neurones; and autonomous nerve centres of coordination, such as the ring ganglia of medusae and the segmental ganglia of worms, become "centres of awareness". In the crustacea stage the "awareness" of the cerebral ganglia overshadows the primitive consciousness of the ganglia of the lower segments. The experience of feeling, the third component of consciousness, is reserved for the more highly organized animals, where it is associated with a centre of emotion.

<sup>1</sup>"The Neural Energy Constant: A Study of the Bases of Consciousness", by J. Bostock, M.B., B.S., D.P.M., M.R.C.S., L.R.C.P.; 1931. London: George Allen and Unwin. Demy 8vo., pp. 196, with illustrations. Price: 6s. net.

The emotional centre is a centre for coarse adjustment of conduct, and in vertebrata is situated in the optic thalamus along with, but separate from, the centre of awareness. The neopallium in the higher vertebrata develops as a "centre of fine adjustment". Consciousness is correlated with a flow of "neural energy" between the three centres of "awareness", "emotion" and "fine adjustment". This is of limited amount, so that the number of neurones which can be activated at one time is relatively small, and "in a condition of health is kept at a constant level of intensity and amount under normal working conditions. This is the 'neural energy constant', and is capable of graphic representation." Normal waking consciousness is determined by an even flow of energy between the centres, variant states of normal and abnormal consciousness by an unequal distribution and occasionally by variations in amount of neural energy. Numerous examples of these variant states are discussed and diagrams given to represent the respective variations of the energy circuit in regard to the centres.

This brief outline indicates that the hypothesis is highly speculative, not deductive. Its chief link with neurology is the adoption of Head's centres of emotion and awareness in the thalami. The centre for emotion may be granted, but Head uses the term "awareness" to describe a protopathic form of contact sensibility appearing as a "release" effect. Bostock seems to use the term with a different significance.

The term "neural energy" is used vaguely. The author postulates its origin in neurones or synapses. It is conceived to move in a circuit, so should be of a kinetic nature. During dreamless sleep the circuit is abolished, but the fate of the neural energy is not considered. In the author's diagrams change of route of neural energy is accompanied by quantitative changes which might be appropriate to diagrams of lines of force, but not to those of mass in motion. The author claims gravity as a precedent in eluding description, but the energy effects of gravity are determinate.

The term "constant" is used to mean "variable within small limits only". But the author does not hesitate to postulate large variations on occasions, and in dreamless sleep the energy circuit is nil. The use of the term "constant" is, therefore, scarcely suitable.

The author is not very convincing either in the application of his own theory or in his criticisms of other theories. His conception harmonizes more with an admittedly schematic system, such as Mercier uses in his "Text Book of Insanity", than with a working hypothesis of physiological psychology. The book, however, will be read with interest by students of psychology.

### BLOOD PRESSURE.

"BLOOD PRESSURE", by Halls Dally, is an excellent *résumé* of the modern knowledge on this subject, put simply and concisely so that it can be easily understood even by those who have had no special scientific or medical training. Most of this matter has already been dealt with by the author in his books on high blood pressure and low blood pressure, but in this manual he has dealt with all the main fundamentals in such a way as to give the beginner a thorough grasp of the subject. The book is divided into two sections. Section I, which is subdivided into ten chapters, deals with high arterial pressure, while Section II is devoted to low arterial pressure. A comprehensive study of all departments is elaborated tersely and concisely, and a very clear differentiation of the various types and the conditions of association is given. The book gives a very sound exposition of modern concepts on blood pressure and may be read with profit not only by any person at all interested in the subject, but also by physicians of experience.

<sup>1</sup>"Blood Pressure: A Manual for Nurses, Hygienists and Social Workers", by J. F. Halls Dally, M.A., M.D., B.Chir., M.R.C.P.; 1931. London: Faber and Faber. Crown 8vo., pp. 116, with illustrations. Price: 3s. 6d. net.



# The Medical Journal of Australia

SATURDAY, JUNE 11, 1932.

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References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

## MEDICAL EDUCATION.

THE faculties of at least two of the medical schools of our Australian universities have been lately engaged with suggestions for amendment of the curriculum. It would appear that the subjects of the earlier years of the medical course are more or less securely entrenched against alteration, any major change in the teaching of physics, chemistry, biology, anatomy or physiology being unlikely, though it has been stated more than once with considerable emphasis that the application of these sciences to the problems of clinical practice should receive greater recognition. Wise counsels have, however, prevailed against a purely utilitarian conception of medical education, and thoughtful students realize that the early years of their course supply necessary instruction in the groundwork of science and in the scientific method, even if much of their labour bears no immediate relationship to their ultimate field of endeavour. "I will point ye out", said Milton, "the right path of a virtuous and noble education; laborious indeed at the first ascent, but else so smooth, so green, so full of goodly prospect, and melodious sounds on every side that the harp of Orpheus was not more charming." The battles of peace, like the conflicts of war, are not won without discipline. That part of the

curriculum which includes the pure sciences remains therefore inviolate.

The reformers are confining their attention to the subjects of medicine and surgery and the minor branches thereof. When reform and wisdom walk hand in hand, the gods smile and the world glows with joy. In the hope that those who guide the destinies of our future medical men and women will move with judicious care and restraint, we write this appeal. There is a growing tendency to shackle the student with endless lectures and demonstrations, given by teachers with unrestrained enthusiasms. The age of specialism has given birth to the zealot, and he seeks to disseminate his gospel among the young and impressionable. And not only some specialists, but also some of those whose duties as teachers are concerned with the broad subjects of general medicine and surgery are in danger of absorbing some of the spirit of the fanatic. The student needs guidance, not driving, inspiration and not hand-feeding. No one will maintain seriously that a student becomes on graduation a competent physician or surgeon. With education hardly begun and experience still embryonic, his skill is potential, not actual. The future will add vastly to his knowledge, rub off the sharp edges of inexperience and ripen his judgement. His studentship has merely fashioned the mould of the future professional man. In hospital and in private practice the evolution of his skill and knowledge goes on. We have reason to be proud of the high standard of efficiency to which the majority of our practitioners attain. In town and country they win admiration for their achievements and bring high honour to our profession.

It is therefore all important that the method of instruction in the subjects which bear more directly on general medical practice should be as satisfactory as possible. It is conceivable that a student could be cast forth on the world like a machine—taught to absorb to saturation point the pathology, symptomatology and treatment of disease and make his egress from the university a veritable encyclopaedia of knowledge. Or the other extreme is possible: he might be allowed to roam at will through the wards and without tuition or guidance, except the knowledge gleaned from books, made to forage

for himself. Fortunately neither of these methods is used exclusively in any university, a more or less wise combination of the two being the rule. But we are conscious that the modern trend of medical teachers is to overwhelm the student with lectures and more lectures, demonstrations and yet more demonstrations, till he is in danger of becoming an automaton. Readers of Newman's "Idea of a University" may remember old Mr. Black's advice to his son Harry, who experienced difficulty in writing good Latin prose: "The great moral I would impress upon you, my dear son, is this, that in learning to write Latin, as in all learning, you must not trust to books, but only make use of them; not hang like a dead weight upon your teacher, but catch some of his life; handle what is given you, not as a formula, but as a pattern to copy and as a capital to improve; throw your heart and mind into what you are about, and thus unite the separate advantages of being tutored and of being self-taught—self-taught, yet without oddities, and tutorized, yet without conventionalities." All education should be liberal in the truest sense, should discipline the mind, at once stimulate and restrain the imagination, and promote that quality of judgement which makes the full man. The universities can do much to dissipate the common belief that the professions are hide-bound by narrowness and prejudice.

We plead that any projected change in the curriculum should not be made without regard to the preservation of that spirit of inquiry and originality of thought which are inherent in the best brains of our students. Let them have lectures by all means, and clinical demonstrations as well. Lectures delivered wisely by learned men stimulate thought in addition to promoting knowledge, while bedside instruction is indispensable to the making of a good clinician. But let the student be spared a plethora of instruction, which will rob him of his independence and strangle his originality. He should have sufficient leisure for independent investigation in the wards, and he should be encouraged in attempts at critical analysis and in the art of "disentangling a skein of thought". He can do none of these things if, like the pupils of Faust, he is pulled by the nose up and down and acrook

and across. In the short space of a few years, only the principles of medicine and surgery can be taught efficiently. Attempts to impose a complicated system of knowledge embracing medicine, surgery and all the specialties on young men and women do not promote but hinder efficiency.

### Current Comment.

#### CHRONIC DUODENAL ILEUS.

THE radiologist has brought a new light to bear on the form and functions of more than one internal organ of the body. In particular the abdominal hollow viscera have been studied in this way, and while it is not forgotten that the conclusions based on the "shadow show" should not be pressed too far, it might be remembered also that the surgeon is at hand to correct or modify the information gained by radiology. In the instance under consideration here, there are certain radiographic signs that may be caused by a variety of abdominal lesions and congenital anomalies; but that a true intermittent obstruction of the duodenum does exist actually as well as radiologically, and that it can be recognized, will be generally allowed. An interesting series of cases has been published by H. F. Shattuck and H. M. Imboden.<sup>1</sup> Their article represents the study of forty-six cases of chronic intermittent duodenal obstruction over periods ranging from six months to eight years, and is the result of the collaboration of a physician and a radiologist. Most of the patients were in the second and third decades of life, and there were four times as many females as males. Two types of ileus are described as being of major importance, one due to bands of congenital or inflammatory origin fixing the first or second part of the duodenum, the other affecting the third part of the organ, caused either by the pressure of the mesenteric pedicle or the ligament of Treitz, or by a sharp occlusive angle at the duodeno-jejunal flexure.

The symptoms in mild cases were indeterminate, including epigastric fullness and flatulence after meals. Occasional attacks of constipation and of vomiting occurred in some instances. It is curious that certain patients showed signs of trouble only in early adult life or later, sometimes after a debilitating illness. Nearly half the patients complained of pain, which varied from slight discomfort to severe distress. This was relieved in some instances by the taking of alkalis or carminatives, and it is of interest that several of the sufferers had learned that the assumption of the knee-chest position gave relief. Many complained that their nausea and anorexia were sufficiently troublesome in themselves to prevent loss of weight, and practically half suffered from actual vomiting. The opaque meal in a number of these persons was found to be partly

<sup>1</sup>The Journal of the American Medical Association, March 19, 1932.

retained after six hours. In addition, the nutritional disturbance was sufficiently severe in many cases to give rise to a heterogeneous series of symptoms included by the authors under the general term "toxic". These are such manifestations as headache, migraine, nervousness, depression, excessive fatigue and emotional instability. While it is doubtful whether these are of true toxic nature, they are important; it is easy to see how such patients might readily be labelled possessors of a gastro-intestinal neurosis. No definite distinction could be drawn between the symptoms produced by obstruction in the various portions of the duodenum; but Shattuck, as the physician, has the impression that duodeno-jejunal block is apt to cause more severe pain and vomiting. The radiographer found that a residue in the stomach after six hours was more frequent when the obstruction was in the first part of the duodenum. Physical examination did not reveal any striking features; but the majority of the patients were of the asthenic habit, with a low blood pressure, general vasomotor instability, and the somewhat narrow costal angle and wide pelvis of the viscerotonic. Epigastric tenderness was common, either on the left or the right side. Chemical investigation of the stomach contents revealed no constant variation from normal. The most important radiographic signs are deformity of the outline of the duodenum and alteration of its alignment and its mobility; but care is very necessary in the interpretation of the X ray appearances. In some cases duodenal ulcer was found, and cholecystitis was present in several.

Treatment is by no means always surgical. With rest, a liberal and bland diet (for malnutrition is common), and the judicious use of postural correction of the faulty condition at those times when symptoms are apt to occur, most of the patients respond well. If the tone of the general musculature can be improved and maintained, perhaps with the help of an abdominal belt, relief can be looked for with confidence. Sedative drugs and correction of intestinal stasis are indicated. The operations most usually carried out were division of constricting bands, and in the treatment of angulation at the jejunal junction, duodeno-jejunostomy. Only eight of the patients in this series were operated on; in five instances operation was followed by excellent results, in one the results were moderately good, while in two the condition remained unchanged. The authors have the impression that the strongest indications for surgery are provided by young persons complaining of severe symptoms of recent origin.

As all practitioners of medicine, excepting those concerned with the most strictly limited fields, must see patients complaining of dyspepsia, they should bear this condition in mind. Fortunately the treatment in most cases will lie within the scope of all, provided there is available an abundant supply of perseverance on the part of both doctor and patient, and, of course, provided the first condition of any

successful treatment is satisfied, that a correct diagnosis is made in the first place.

#### PYORRHOEA ALVEOLARIS.

THE treatment of *pyorrhoea alveolaris* has always presented a difficult problem. Most medical practitioners and dentists agree that extraction of the offending teeth is the only proper treatment. From time to time certain plastic operations have been described; they have not been generally adopted, nor have they met with much enthusiasm. It must be taken that, on the whole, the results of operation have been disappointing. Recently H. H. Stones has drawn attention to the possibilities in surgical treatment apart from extraction of the teeth.<sup>1</sup> He declares that the causes of recurrence after operation are lack of suitable preliminary treatment, insufficient attention to detail during the performance of the operation, lack of suitable post-operative treatment, and insufficient care in the selection of patients for operation. The aetiology in each instance must be investigated. If a probable cause is discovered, efforts must be made to eliminate it. The condition of the gums and teeth must be made as hygienic as possible, by means of scaling, local applications and other measures. An autogenous vaccine must be administered with the object of increasing the patient's resistance; otherwise the operation is likely to be followed by a violent toxæmic reaction. When all these preliminary measures have been carried out, the patient is ready for the operation of gingivectomy, the object of which is the obliteration of the pus pockets between the teeth and the gum.

The operation is performed under local anaesthesia, which Stones prefers to nerve "blocking". The depth of the pockets may be ascertained by means of radiography and probing. The gum is cut away on the buccal and lingual sides of each tooth and in the interdental spaces, so that the pockets are completely removed. The raw surfaces are then treated with an electric cautery. However many teeth are affected, they are all dealt with at the one sitting. After-treatment is very important; unless it is efficiently and conscientiously carried out by the surgeon and the patient himself, recurrence is likely.

Only a person compelled to wear a full artificial denture can appreciate the value of a set of normal healthy teeth. If *pyorrhoea alveolaris* can be cured by an operation that does not involve the loss of teeth, by all means let operation be performed. Stones's operation is a severe one, but it is a conservative procedure, and it is probably not as severe as the extraction of a great many teeth at one sitting. Of course, the patients must be carefully selected; it is obvious that a rocking tooth bathed in the pus of its own alveolus cannot be saved by the removal of its surrounding gum.

<sup>1</sup> *Proceedings of the Royal Society of Medicine*, April, 1932.



## Abstracts from Current Medical Literature.

### MEDICINE.

#### The Diagnosis of Pulmonary Tuberculosis.

LAWRASON BROWN (*The American Journal of the Medical Sciences*, November, 1931) discusses the importance of Röntgen ray examination in the diagnosis of pulmonary tuberculosis. He records that of five cardinal diagnostic data in 1,367 cases in which a diagnosis of pulmonary tuberculosis was made at the Trudeau Sanatorium, the percentage incidence was as follows: Tubercle bacilli in sputum, 61; râles at an apex, 69; positive X ray evidence, 99; occurrence of hæmoptysis of a drachm or more, 33; occurrence of pleurisy with effusion, 12. He admits that while the significance of physical signs at a pulmonary apex may be doubted by some, the importance of X ray mottling in the upper third of the lung is still questioned by many. He has analysed, therefore, the histories of 503 patients who presented on first examination slight or no physical signs, and in whom the diagnosis of pulmonary tuberculosis depended largely or wholly on X ray examination. By careful analysis he was able to satisfy himself of the correctness of the diagnosis on other grounds in all but 56 of these patients. On X ray evidence he decided that eight of the remainder had arrested tuberculosis and 48 had apparently active disease. Of these latter he felt justified in concluding that 30 might have been diagnosed before the introduction of the Röntgen ray, while 18 could not have been, with consequent disaster in some at least of the cases. The author is convinced that X rays will reveal the lesions of the disease long before it is manifested in any other way. He concludes that we are in a new era in regard to the diagnosis of pulmonary tuberculosis, to which both clinician and radiologist, even though they refuse to admit it now, will eventually have to conform.

#### Electrocardiography in Prostatic Obstruction.

C. M. BACON, H. L. KRETSCHMER AND L. W. WOODRUFF (*The Journal of the American Medical Association*, October 24, 1931) report the results of electrocardiographic study of 321 patients suffering from prostatic obstruction. Various cardiac abnormalities were found, of which 115 were regarded as chronic myocardial degeneration, usually accompanied by arteriosclerosis. The diagnosis of myocardial degeneration was based on definite slurring or notching of the QRS waves in at least two leads, prolongation of the QRS waves beyond 0.1 second, or inversion of the T wave in lead I or II. Rest in bed was advised until the heart function is improved, and large amounts of fluid, up to 6,000 cubic centimetres daily, should be given to combat infection,

to assist the impaired renal function, and to relieve the extreme dehydration. Slow decompression of the bladder in acute retention is very important. The blood pressure falls for some time after drainage is started, and a constant level should be maintained before operation. Four patients in this series died after operation. Two died of coronary thrombosis; one of them had shown evidence of myocardial degeneration; the other died quite unexpectedly. A third patient, who had in the electrocardiogram an inverted T wave in lead I, died suddenly twenty hours after diverticulotomy; and a fourth, who had long-standing rheumatic heart disease with definite myocardial damage, died, although he had appeared in good condition before operation. Sacral anaesthesia is recommended in preference to spinal anaesthesia, in which a marked fall of blood pressure occurs. The use of sacral anaesthesia eliminates the cardiac embarrassment or respiratory complications associated with ether, ethylene or nitrous oxide.

#### Diagnosis of Splenic Tumours.

E. E. BAUKE (*Deutsche Medizinische Wochenschrift*, July 3, 1931) states that the diagnosis of subphrenic tumours, especially in the splenic area, has been greatly simplified by the use of contrast injections followed by radiography. He has used a thorium dioxide solution recommended by Radt. This apparently affects the reticulo-endothelial system and causes the appearances of liver and spleen to contrast strongly in a radiograph. The drug is given intravenously in doses of ten cubic centimetres on five consecutive days. A slight rise in temperature may occur on the first day; but this reaction is largely avoided by warming the solution and injecting slowly.

#### Microfilariae in Sputum.

P. K. GHOSH (*The Indian Medical Gazette*, February, 1932) reports three cases in which microfilariae were voided with the sputum. In each instance the patient was suffering from hæmoptysis. The author remarks that, according to Manson, microfilariae that appear in the peripheral blood by night, chiefly inhabit the vessels of the lungs and kidneys during the day. The sputum in which microfilariae were found was voided in the early morning, that is, at a time when the organisms are leaving the peripheral vessels and passing to the internal organs. The question arises: Are the microfilariae capable of piercing the alveolar wall, thereby causing cough and hæmoptysis? In one of the sputa examined by the author, acid-fast bacilli were observed.

#### Osteomalacia.

T. A. HUGHES, D. L. SHRIVASTAVA AND K. S. MALIK (*The Indian Journal of Medical Research*, October, 1931) discuss the results of their observations on the blood chemistry of persons suffering from osteomalacia.

They point out that, although in most instances the calcium and phosphorus content of the blood plasma is similar to that of infants suffering from rickets, there may be considerable variation. Some observers have noted that the serum calcium content is higher than normal; others that it is lower; some that the serum phosphorus content is within normal limits; others that it is lower than normal. The authors found that, whatever the initial values for the serum calcium and phosphorus, patients progressed most favourably under treatment when the calcium content was maintained at a normal level and the phosphorus content at the same level as in infancy, or higher. If treatment is satisfactory, the values rise or fall according as they are below or above the optimum before treatment is commenced.

#### Acute Endocarditis During Pregnancy.

N. ALDERS (*Monatsschrift für Geburtshilfe und Gynäkologie*, February, 1932) has reviewed the cases of endocarditis occurring in the Second Clinic at Vienna. The cardinal symptoms were tachycardia, moderate temperature and anæmia; although in many cases these symptoms were masked. The onset in many instances is infection during the puerperium. Tonsillar infection also plays an important rôle; other foci noted were in the urinary tract, ears and teeth. In no instance did endocarditis follow acute articular rheumatism or chorea. The prognosis depends mainly upon involvement of the myocardium. While most authorities recommend interruption of pregnancy in fresh cases, the author presents several histories to illustrate the danger of such procedure. In his experience the cardiac lesion is not improved by this means, and in fact, frequently, definite retrogression is provoked. Caesarean section performed late in pregnancy frequently causes the mother to become worse rapidly, and causes enfeeblement of the infant from intrauterine infection. Prophylaxis by removing various sources of infection during pregnancy offers the best results.

#### Allergic Migraine.

R. M. BALYAT AND H. J. RINKEL (*Annals of Internal Medicine*, December, 1931) state their conclusions on the data obtained from a review of 202 consecutive cases of migraine examined at their private clinic, and from a personal interview or through a detailed questionnaire of 2,728 persons. They believe that the exciting factor in probably 100% of true migraine cases is a specific sensitization to one or more foreign proteins. Migraine, like other allergic diseases, affects those with highly developed vegetative nervous systems. It is interchangeable in the linkage with other allergic syndromes, and more commonly affects females than males, and brain workers than unskilled labourers. Some of their patients were under the age of five years.

29.7% gave a history of the onset of symptoms before the age of ten, and 30.6% before the age of twenty. More than three-quarters of all migraine patients whom they have studied suffered from other allergic disease; there was a family history of allergic disease in 82% of their patients. The commonest predisposing factors are physical and mental fatigue and depressed states, thyroid dysfunction, genito-sexual conditions, toxic states (including the effects of exogenous toxins), and disturbance of the special senses. They use the intradermal method of testing for food sensitivity. While any food or combination of foods may cause migraine, the following, as aetiological factors, are of importance in the order given: Milk, wheat, eggs, nuts, beans, fish. Multiple sensitization to food is very much the rule. A mild reaction to a particular food may be much more important than a pronounced reaction to some other food. They believe that, as migraine is allergic, the typical pathological lesion is local oedema. Anaphylactic and allergic reactions are not the same, but are similar in many respects. The site of reaction in anaphylaxis of the rabbit is in the muscle of the arteriole of the lung; in the guinea-pig the site of reaction is in the muscle of the bronchiole; in the dog the site of reaction is in the liver. Allergic reaction to wheat may show in one patient as asthma, in another as hives, in another as "hay fever", and in a fourth as migraine. In each case there is a localized oedema. Multiple localized areas of vasomotor dilatation seem to explain best the symptoms of multiple localized cortical irritations complained of by those who suffer from migraine. The treatment of migraine on allergic findings gives results equal to the treatment of practically any other chronic disease.

#### Cardiac Displacement in Pulmonary Tuberculosis.

CHRISTOPHER CLAYSON (*Edinburgh Medical Journal*, March, 1932) discusses the cause and treatment of retractive displacements of the heart in pulmonary tuberculosis. In the aetiology the most important factor is unilateral disease of fibrotic type. Pleurisy, especially when accompanied by effusion, is often followed by sclerosis. This pleuritic retraction may displace the heart considerably; so also may cavitation, by virtue of the cicatricial contraction. Inasmuch as displacement of the heart indicates a healing fibrotic process, it is of good omen. In the later stages, however, there is mechanical impediment to the heart's action, leading to considerable cardiac embarrassment and perhaps to serious heart failure. He points out in this connexion that persistent tachycardia may not be due to active tuberculous disease, but to a displaced heart. When the X ray reveals a displaced heart he urges the immediate institution of deep breathing exercises. They may restore the heart to its normal position or, if

begun earlier, they may prevent an impending cardiac displacement. Should they fail, and embarrassing symptoms develop, phrenic avulsion is the correct treatment to adopt.

#### Pepsin Therapy.

K. GLAESSNER (*The Lancet*, January 9, 1932) describes his pepsin therapy for gastric and duodenal ulcers. Hydrochloric acid is the essential factor in causing these ulcers, but some other factor, due to local irritation of the mucosa by embolus, toxins such as nicotine, infection, vagus nerve lesions or local arterial disease, must be present. Gastric hydrochloric acid injections will cause ulceration of the skin or mucosa in animals, and these ulcers are rapidly cured by injection of a neutral pepsin solution subcutaneously. This treatment has been applied for peptic ulcers with success. Thirty injections are given (one daily or every other day) twice a year. A dose of 0.2 to 0.5 cubic centimetre of a specially prepared pepsin is used. The acidity of gastric juice diminished, symptoms ceased, and weight increased in two-thirds of the cases. The X ray findings were similarly reversed. Ulcers of mucosa and skin have been treated successfully in this way also.

#### Death Due to a Scorpion's Sting.

In reporting a fatal case of scorpion sting, S. K. Sundaram (*The Indian Medical Gazette*, September, 1931) refers to a case reported by H. T. Ince, in which death was due to acute pulmonary oedema. The author's patient was a boy, aged eighteen years, who was admitted to hospital five hours after he had been stung on the left index finger by a scorpion. The patient complained of pain in the chest. Coarse and fine râles were to be heard all over the chest. The boy constantly voided thin, frothy, blood-stained sputum. Death occurred two days after admission. *Post mortem* examination revealed petechiæ of the surfaces of the heart and pericardium. The mitral and tricuspid valves were slightly thickened. Both lungs were congested, especially at the bases; blood and froth exuded when the organs were sectioned. The cut surface of the liver was mottled in appearance. The spleen and kidneys were slightly congested.

#### Tachycardia.

C. W. BARRIER (*Annals of Internal Medicine*, January, 1932) describes observations on twenty-six patients with tachycardia of the auricular and nodal types. In adolescence tachycardia is often associated with a nervous instability; in women at the menopause, with debility and flatulence due to overwork and worry. The attacks may be of short duration or last for years. They may occur with a variety of affections of the heart: myocardial disease, mitral stenosis and heart failure due to many causes. Digitalis, atropine and adrenalin or ephedrine may induce tachycardia. The nodal type has the more serious prognosis. Clinically

these conditions are characterized by abrupt onset and arrest, repetition of attacks, regularity of rhythm and arrest by vagus stimulation. Symptoms may be mild or serious, depending on the state of the heart muscle or associated disorders. Rest, chloral and bromides often arrest the attacks. Massive doses of digitalis were successful in eight cases. Quinidine arrested attacks in nine out of ten, but the dose had to be increased from 0.24 gramme (four grains) to 1.26 grammes (21 grains) per day in some. Digitalis and quinidine were used alternately with success in some instances. In one case, in which the vagus nerve was paralysed by atropine, digitalis failed to relieve the tachycardia permanently, hence it is assumed that the action of digitalis here is on the vagus. Continued use of digitalis is preferred to quinidine, but toxic effects of both drugs must be anticipated.

#### Tincture of Ephedra as a Cardiac Stimulant.

E. H. VERE HODGE (*The Indian Medical Gazette*, November, 1931) points out that though the value of ephedrine as a therapeutic agent has been recognized for some years, its dextro-rotary isomer, pseudo-ephedrine, has received little attention. Pseudo-ephedrine occurs in large quantities in the Indian species of ephedra, and has been studied by Chopra and his collaborators at the Calcutta School of Tropical Medicine and Hygiene. These workers found that the pharmacological action of pseudo-ephedrine is very similar to that of ephedrine. Both drugs are rapidly absorbed from the alimentary tract, both cause vasoconstriction and increase in the blood pressure. Ephedrine, which acts almost entirely on the vasomotor nerve endings, has a much more powerful vasopressor effect than pseudo-ephedrine, which acts both on nerve endings and muscular coat. Pseudo-ephedrine also has a distinct stimulant action on the cardiac muscle. Ephedrine causes an increase in the flow of blood through the coronary circulation. The author remarks that this is of importance in the treatment of children suffering from acute infectious diseases; for the adrenals of such patients often become exhausted early in the course of the disease. Obviously, a combination of ephedrine and pseudo-ephedrine in suitable proportions should be a cardiac stimulant superior to ephedrine alone, in that it would strike a nice balance between vaso-constriction on the one hand and myocardial stimulation with increased coronary flow on the other. Chopra has therefore prepared a tincture containing equal parts of ephedrine and pseudo-ephedrine, which the author has employed in the treatment of persons suffering from pneumonia, diphtheria and septicæmia. He gives several histories of cases, with the object of illustrating the influence of tincture of ephedra on the failing heart in acute infectious diseases.

## British Medical Association News.

### SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Queen Victoria Hospital, Melbourne, on March 16, 1932. The meeting took the form of a series of clinical demonstrations.

#### Adenocarcinoma of the Kidney.

DR. ELLEN M. BALAAM showed a female patient, aged fifty-three years, who was admitted to hospital on April 13, 1930, with a history of right-sided abdominal pain associated with smoky urine. During the previous sixteen months the patient had noticed that the urine was smoky and dark in colour for two to seven days after the intermittent attacks of right-sided pain, which radiated to the groin. Vomiting accompanied some of these attacks.

During the most recent attack the pain was suprapubic in position, with some slight scalding on micturition. Between the attacks the urine was clear. On examination the patient was very pallid. The heart and lungs were normal. The systolic blood pressure was 170 and the diastolic pressure 80 millimetres of mercury. Palpation revealed a hard enlarged right kidney, which extended almost to the groin.

On April 16, 1930, Dr. Balaam performed a right nephrectomy by the transperitoneal route, with the T-shaped incision recommended by H. H. Young in his "Practice of Urology", 1926.

The anæsthetic used was "Avertin", administered *per rectum* by Dr. Balaam and then supervised by Dr. Campbell. The right kidney was found to be slightly movable, cystic, irregular and enlarged, extending from the liver above to well down into the pelvis. The left kidney was palpated and appeared normal. By gradual movement the posterior surface of the kidney was elevated from its pouch, and after ligation and division of the renal vessels and ureter, well clear of the kidney, the organ was delivered in entirety.

The microscopical report on this specimen, from the Melbourne University, was: "Section shows the tumour to be clear-celled type of adeno-carcinoma arising from the tubules of the kidney. There is much necrosis, degeneration, and hemorrhage. The kidney shows a condition of chronic nephritis with much glomerular fibrosis and sclerotic arteries."

Dr. Balaam pointed out that, looking very well, the patient was discharged on June 11, 1930, and had enjoyed perfect health ever since. Now, nearly two years since her operation, she had gained two stone in weight and was very well, with a perfectly strong abdominal wall, despite the extensive incision. There had been no hæmaturia since.

Dr. Balaam remarked that the T-shaped incision recommended by H. H. Young was valuable in that it permitted exploration of the abdomen and the other kidney and allowed direct inspection of the diseased kidney *in situ*, giving the maximum of operating room.

The "Avertin" anæsthesia, insuring total placidity of the bowels and absence of visceral heaving, enabled perfect packing off of the intestines with an absence of operative shock and of post-operative vomiting; the latter was thus conducive to strong healing of this extensive incision in the abdominal wall.

Early ligation of the pedicle vessels close to the inferior vena cava was done to lessen the chances of embolic infection. The ureter was ligated well away from the kidney.

Then the kidney, with its overlying peritoneum, together with the fatty vascular and lymphatic perinephric tissues, was removed *en masse*. Drainage of the cavity thus left was done through an independent stab wound in the loin. The macroscopical specimen and the section for microscopy were demonstrated at the meeting.

#### Tuberculosis of the Kidney, Ureter and Bladder.

Dr. Balaam also showed a female patient, aged twenty-four years, who was admitted to hospital on July 14, 1931, with a history of frequency of micturition, day and night,

with dysuria and *pruritus vulvæ* for six months previously. Hæmaturia occurred six months ago with intermittent attacks since. There was no history of cough, night sweats, tiredness, loss of appetite or any loss of weight. Her mother died of tuberculous laryngitis at the age of forty-nine years.

On admission, the patient was well nourished in appearance, with good colour and no pain. Nothing abnormal was detected in the heart or lungs. She had slight tenderness and fullness in the hypogastric region, and also in the right loin. The systolic blood pressure was 115 and the diastolic pressure 95 millimetres of mercury.

This patient was attended first in the out-patient department on April 29, 1930, and her urine examination revealed pus cells with some red blood corpuscles. Tubercle bacilli were found in the urinary sediment. Laryngoscopy revealed a normal larynx. In the blood sedimentation test the reading dropped from 0 to 24 in 60 minutes. On July 4, 1931, a cystoscopic examination by Dr. Ann Macleod revealed general ulceration of the trigone, extending to the right ureteral orifice. A few areas showed typical tuberculous ulceration. The area around the left orifice was clear. The bladder capacity was eight ounces.

Dr. B. Wood's X ray report, July 8, 1931, after an intravenous injection of "Abrodil", showed the left renal pelvis to be normal, and apparent ptosis of the right kidney. Poor functioning was present and the renal pelvis was poorly filled.

On July 29, 1931, under "Avertin" anæsthesia, which gave perfect relaxation of the tissues, Dr. Balaam performed a right nephrectomy through a right lumbar incision, with removal of the thickened right ureter as far as possible beyond the pelvic brim, almost to the bladder. Rubber drains were inserted into the wound cavity and removed in seven days. There was slight hæmaturia on August 20, 1931, and the wound was healed on September 6, 1931.

On September 10, 1931, cystoscopy by Dr. Macleod revealed ulcerated patches, only some healing, with much scar tissue around. There was one ulcerated patch, lateral to the left ureteral orifice. The right ureteral orifice was still red, with a tendency to bleed; some secondary trigonitis was present.

The patient thence improved in health and gained in weight, the urinary symptoms practically disappearing until January 26, when some frequency and painful micturition recurred, accompanied by a loss of five pounds in weight. On January 29, 1932, cystoscopy showed no further bladder involvement. The bladder would hold only five ounces. Examination of a catheter specimen of urine revealed pus cells, no red corpuscles, no casts, and a few organisms, mainly cocci. No tubercle bacilli could be found.

The preserved specimen of this pyonephrosis together with a microscopical section showing tuberculous inflammation was demonstrated at the meeting.

#### Acute Thyreotoxicosis.

Dr. Balaam also showed a female patient, aged thirty-one years, who had been admitted to hospital on June 30, 1931, with a history of good health until twelve months previously, when she became easily tired, irritable and nervous, with spasms of weeping. Six months previously she noticed a slight swelling in the front of the neck, which rapidly became enlarged during two months prior to admission, with prominence of the eyeballs. Other recent symptoms were a feeling of heat, profuse sweating, shortness of breath on the least exertion, frequency of micturition and earache. Her weight had been reduced from 81.9 kilograms (thirteen stone) to 64.8 kilograms (ten stone four pounds). Two nights before admission she had a choking sensation, difficulty in breathing, with a feeling of tightness of the throat.

On admission she had tremor of hands and fingers, clammy, hot hands, exophthalmos, with twitching of the eyes. Von Graefe's sign was present. The temperature was normal, the pulse rate 126, and respiratory rate 26. The systolic blood pressure was 145 and the diastolic pressure 100 millimetres of mercury. The apex beat of the heart was in the fifth intercostal space 8.75 centimetres (three and a half inches) from the mid-line. There was no right cardiac dullness. The heart sounds were regular



and clear. The thyroid gland was considerably enlarged and extended from one mandibular angle to the other. The basal metabolic rate was +38%. The patient was rested in bed for two weeks and treated with Lugol's solution. The pulse varied from 144 to 100 per minute. Prior to operation 8.0 mils (two fluid drachms) of Lugol's solution were given *per rectum* in 180 cubic centimetres (six ounces) of saline solution. On July 22, 1931, Dr. Balaam performed partial thyroidectomy, removing the whole of the right lobe, the isthmus, and the major portion of the left lobe, leaving only a small piece, the size of an almond, of the upper pole. The anæsthetic used was ethylene and oxygen. The patient made an uneventful recovery and was discharged from hospital on August 10, 1930.

Dr. Balaam said that the patient was now very well, and her basal metabolic rate, taken on February 27, 1932, was +16%. The rapid onset of acute symptoms and the rapid great enlargement of the thyroid gland were the interesting features of this case.

#### Dwarfism and Hypopituitarism.

DR. MARION WANLISS showed a series of patients suffering from dwarfism and hypopituitarism.

The first patient was suffering from precocious myxœdema; she was a woman, aged fifty-six years, married. She was said to have been a big baby, though the actual birth weight was not known; she grew normally until the age of twelve years, when she contracted scarlet fever, apparently not associated with thyroiditis, and was in bed for three months. After this she became drowsy, always felt cold, her memory failed, her skin became very dry and her hair fell out. Since that time she had not increased in height, though she gained weight, due to the development of the characteristic œdema of thyroid deficiency. For the past twenty years she had taken 0.12 gramme (two grains) of thyroid extract every day. She had been married nine years, and had never become pregnant, though no contraceptives were used. *Libido sexualis* was absent. Menstruation commenced at the age of fifteen, and occurred approximately every three months, lasting two to three days; the menopause took place five years ago. On examination the patient's height was 125 centimetres (four feet two inches). Her weight was 44.2 kilograms (seven stone one and a half pounds). Her temperature was 36.5° C. (97.8° F.). Her pulse rate was 68. Her intelligence was good. Her skin was dry and flaky. Her face was pale and somewhat puffy. Her hair was very dry. Her eyebrows were normal. She had no axillary or pubic hair. Her hands were spatulate. Her tongue was big and coarse. She had slight supraclavicular pads. The thyroid was not palpable. The mammae were well developed. No abnormality was detected in the heart or lungs. The specific gravity of the urine was 1.024; it was acid and contained neither albumin nor sugar. The Wassermann test had yielded no reaction. The basal metabolic rate, after the thyroid extract had not been given for fourteen days, was -26%. Blood examination revealed no abnormality.

Dr. Wanliss's second patient was a single girl, aged fourteen and a half years. Her mother was alive and well, and the mother's weight was 97.6 kilograms (fifteen stone seven pounds). The father was dead and was said to have been a big man. The patient's weight at birth had been 3.8 kilograms (eight and a half pounds). The patient had had influenza at six years of age. For the past two years she had complained of irregularly occurring diurnal headaches. Nine months ago these became very severe and were associated with vomiting. On one occasion the headache was followed by an epileptic fit with loss of consciousness for about half an hour. The patient struggled at the start of this fit, but did not bite her tongue or lose control of bladder or bowel. After this she had attacks of giddiness, and once, while seated at table, she could see only the left half of objects. The hemianopia lasted for a quarter to half an hour and did not recur. Recently she described uncontrollable fits of yawning, not associated with any stretching movements, and occasional sensations of objective rotation. No yawning fits had been observed since the patient had been under observation.

The patient's bowels acted regularly. She had no frequency of micturition or scalding. She suffered from oliguria. The urine was acid, had a specific gravity of 1.028, and contained no albumin, sugar or casts. Menstruation began at twelve and a half years of age and was regular.

On examination the patient was a fat girl. She weighed 78.9 kilograms (twenty stone eight pounds). Her temperature was 37.5° C. (99.6° F.). Her pulse rate was 100. Her systolic blood pressure was 120 and her diastolic pressure 70 millimetres of mercury. Dr. Wanliss pointed out that while the patient had been under observation for the past three weeks, her temperature had been persistently raised from 37.2° to 37.8° C. (99° to 100° F.) and this had been confirmed by taking the temperature in the rectum.

The patient's forehead was low and her face large when compared with the cranium. Her intelligence was good. She had no diurnal somnolence. Her skin was coarse and greasy. The hair on the scalp was plentiful and moderately coarse. The pubic and axillary hair was normal. The hands were fat and podgy, with tapering fingers. The thyroid was not enlarged. The mammae were pendulous. The heart and lungs appeared normal. *Genu valgum* was present. The fundi and fields of vision were normal. Visual acuity with glasses was good. The other cranial nerves were normal. The reflexes were normal. The Wassermann test gave no reaction. The basal metabolic rate was -9%. The *sella turcica* was not enlarged; its outlines were clear. The blood sugar curve was typical of hypopituitary lesions. As the patient was not apyrexia, Cushing's thermic test, if used, could not be regarded as reliable. The provisional diagnosis was a lesion of the pituitary and hypothalamic regions, possibly post-encephalitic.

The third patient shown by Dr. Wanliss was a girl, aged eighteen years, single, the only child of healthy parents of average weight. The patient's birth weight was not known, but was said to have been average. She began to gain weight excessively at the age of six years. There was no history suggestive of meningitis or encephalitis *lethargica*. The patient came to hospital in 1926, when thirteen years of age. She then weighed 86.4 kilograms (thirteen stone ten pounds). On X ray examination the pituitary fossa was found to be small and of the undeveloped type. The blood sugar curve showed a slow rise and fall. The patient returned to hospital after an absence of four years on January 1, 1930, and her weight was 104.8 kilograms (sixteen stone nine pounds). After the administration of thyroid and pituitary extract her weight fell, but only if the thyroid was increased in amounts at intervals of four to five weeks. The patient was still taking thyroid and pituitary extract at the time of the meeting.

On examination the patient weighed 78.3 kilograms (twelve stone six pounds). Her height was 155 centimetres (five feet two and a half inches). Her temperature was 37.2° C. (99° F.), her pulse rate 100. Her systolic blood pressure was 128 and her diastolic pressure 80 millimetres of mercury. Her forehead was low, her intelligence moderately good. She had some diurnal somnolence. The hair on her scalp was thick and moderately coarse. Axillary and pubic hair was present. She had a few sparse hairs in the submental region. Her hands were small, with tapering fingers. Her skin was somewhat dry, and her thyroid was not enlarged. Her mammae were pendulous, and striæ were present on the skin, especially of the upper part of her arms and thorax. Lungs, heart and abdomen were normal. The *mons veneris* was hypertrophied. *Genu valgum* was present. The fundi and fields of vision were normal. The reflexes were normal.

The next patient was a single girl, aged eighteen years. She complained of amenorrhœa and occasional bilious attacks, of frontal headaches coming on at irregular intervals and associated with nausea and vomiting; these attacks had occurred for the past three or four years. During this time the patient had not increased in height, though she had increased slightly in weight. She had never menstruated. Her weight was 49.5 kilograms (seven stone twelve pounds) and her height was 135 centimetres (four feet six inches). Her physique approximated to that of a girl of fourteen. There was some degree of mental

torpor, but no drowsiness. The face had a somewhat puffy, doughy appearance. Her hands were small and delicate, she had tapering fingers and the skin was smooth and fine. Axillary hair was absent and pubic hair was sparse. There was no enlargement of the thyroid and no development of the mammae. The pituitary fossa was small, with ill-defined clinoids; the floor of the fossa was clearly outlined. The basal metabolic rate was  $-3\%$ . The blood sugar curve was normal. Cushing's thermic test gave no reaction. The diagnosis was infantilism of the Lorrain type.

The next patient was a girl, aged nineteen years, single, the fourth child in a family of five, the rest of the family being normal in size. The child's birth weight was reported as having been 3.1 kilograms (seven pounds). She had never been breast fed. She had been given no orange juice or cod liver oil and no cow's milk. She was subject to bronchitis every winter until she was four years of age. She had not suffered from *laryngismus stridulus* and her dentition was not delayed. She had never menstruated. Her weight was 32.4 kilograms (five stone two pounds) and her height 135 centimetres (four feet six inches). Her physique resembled that of a child of thirteen. Her intelligence was good. Frontal bossing of the skull was present and the teeth were well developed. The palate was abnormally highly arched. The skin was normal. The hair on the scalp and eyebrows was normal, there was no axillary hair and the pubic hair was scanty. The thyroid was not enlarged. The mammae were not developed. The systolic blood pressure was 92 and the diastolic pressure was 74 millimetres of mercury. No Harrison's sulcus was present in the chest and no "rosary". The hands were small, with lax ligaments. No *genu valgum* and no bowing of the tibiae was seen. *Pes cavus* was present. The external genitalia were small, but otherwise normal. No abnormality was detected in the *sella turcica*. The blood sugar curve was normal. Cushing's thermic test gave a positive reaction. The diagnosis was infantilism, possibly due to malnutrition in infancy and possibly of the Lorrain type.

Dr. Wanliss's last patient was a single woman, aged fifty-three years, the last and smallest member of a family of six. She had reached only the third grade at school. Her weight was 27 kilograms (four stone four pounds) and her height was 120 centimetres. The circumference of the head was 47.5 centimetres (nineteen inches). There was no frontal bossing. No syphilitic stigmata were detected. The intelligence was very low—the patient was definitely a moron. The face was hirsute and the voice hoarse. There was a small adenoma in the left lobe of the thyroid. There was no axillary hair and the mammae were undeveloped. The diagnosis was cerebral dwarfism.

#### Kielland's Forceps.

DR. ROBERTA DONALDSON gave a demonstration of Kielland's forceps. She said that they were longer and lighter than ordinary forceps with a cephalic curve and practically no pelvic curve. They were used almost exclusively in countries such as Germany and Austria, where manual rotation was little practised. Their application was always to the biparietal diameter of the head in any position of the pelvis.

In regard to dangers, their application caused no injury to the child. Severe maternal injuries might occur if in the high extraction, rotation and extraction were performed together.

Their chief uses were: (i) In posterior positions, when they were used for rotation as well as extraction. (ii) To pull a head engaged at the brim in the transverse diameter straight into the cavity of the pelvis before rotation took place.

They were applied with the patient on her back. The position of the head should be visualized and the blades applied with the slight pelvic curve and the lock toward the leading point, generally the occiput. The left blade had the lock in which the right blade slid, making it possible to apply the blades and lock them so that they had a good hold of the head, even though the latter was in an asynclitic position.

In application at the brim (high forceps) the head should be definitely engaged. It was engaged normally with the biparietal diameter in the antero-posterior diameter of the brim and the blades were applied biparietally.

In left occipito-transverse presentations the anterior blade (right) was applied first. It was introduced with its cephalic curve towards the symphysis until the neck of the blade lay between the head and the symphysis; the blade was then turned  $180^\circ$  round its longitudinal axis, so that the forceps lay in their right position in relation to the head. Deep anaesthesia was necessary. The forceps were rotated towards the button on the shank, then the convex side of the blade was against the abdomen and the concave side rotated over the head; otherwise the rotation was difficult and the uterus might be ruptured. The left or posterior blade was pushed up between the head and the promontory of the sacrum until the forceps could be locked. The head was pulled into the pelvis by vertical traction, and after rotation had taken place, delivered in the same way as with ordinary forceps.

With a transverse position in the cavity the forceps were applied as ordinary curved forceps, but to the biparietal diameter. The anterior blade was introduced from below, with its concavity towards the head, the posterior blade was slipped in and kept in the mid-line; the lock and curve had to be towards the occiput. If the forceps would not rotate easily, the head was pushed up a little with the blades and it would probably rotate, otherwise the head was pulled down towards the perineum and it would want to rotate as it came down.

With the head in the outlet in the oblique left occipito-anterior position, the blades were applied biparietally in the oblique diameter of the pelvis. The left blade was at a position of "4.30 o'clock". The right blade was introduced at the 9 o'clock position and was moved by wandering to the 10-30 position. If a gentle pull was made, it would rotate at once.

For posterior positions of the vertex there were two methods. They might be applied with the lock towards the sinciput or towards the occiput.

If the sinciput was leading and the head was in persistent occipito-posterior position, the forceps were applied with the curve and lock towards the sinciput and the child was delivered as a posterior presentation. A vertical pull was made till the hair line appeared. The grip was changed and the blades drawn over the symphysis, freeing the occiput; they were lowered towards the anus to deliver the face, and the forceps were drawn off. Another way was to rotate the head in the forceps and bring out the head with the forceps upside down.

The forceps might be applied with the curve and lock towards the occiput and the child delivered as a posterior presentation. Or with the curve towards the occiput, rotation was carried out before extraction, the head being pushed a little back and rotated to whichever side was easier, and delivered in the anterior position.

In regard to face presentation the forceps were applied with the lock towards the leading point, the chin. They were applied bitemporally, by lifting the blades they were made biparietal, a vertical pull was made till the chin was born, the grip was then changed and the child delivered.

In regard to breech presentations the forceps might be applied to the after-coming head. They were of especial use when the head had not rotated. They were applied with the curve towards the occiput. In an impacted breech they might be applied bicristally, with the lock towards the sacrum. The obstetrician should not rotate, but extract in the same diameter as the forceps were applied.

#### Coxa Protrusa.

DR. MONA BLANCH showed a girl of fifteen years with unusual deepening of the acetabula, otherwise known as *coxa protrusa* or *arthrokatadysia*. She had never been as good as other children at running, as her legs felt stiff round the hips and thighs. Two years previously she had fallen from the umpire's seat on a tennis court and landed in a squatting posture. She was dazed for two hours,

but seemed well next day. Shortly after this she was noticed to be walking as though her left leg hurt her, though there was no limp until eighteen months ago. On examination fifteen months ago she was found to have gross limitation of movement of both hips in all directions, but most markedly in abduction. X ray examination revealed intrapelvic protrusion of the acetabula, narrowing of the joint space on both sides, some degree of bilateral *coxa vara*, and early epiphyseal fusion. During the next year she became progressively worse, the stiffness being marked after sitting down or in damp weather, but pain only being present when attempting to rise after sitting for any considerable length of time. The pain and stiffness were more noticeable in the right hip at this time, and there was considerable wasting of the right lower limb which was adducted with compensatory tilting of the pelvis, but no true shortening. No movement of the right hip could be obtained, but in the left flexion to 40° was possible. X ray examination revealed atrophic arthritis of both hip joints, with much loss of cartilage, but no bony ankylosis. The heads of the femora were seen to project into the pelvis as in the previous skiagram. A double plaster spica was applied with the hips as much abducted as possible. After two months this was removed. Her general condition was satisfactory, and she appeared to have gained weight, but there was no increase in movement of the hips. Under an anæsthetic soft adhesions were felt to give way with gentle manipulation, and it was possible to flex both hips to 90°. About 25° abduction was possible in the left hip, but only about 10° in the right. There was very little rotation possible at either hip. X ray examination revealed the same condition as two months previously. There was no arthritis apparent in the spine and complete examination could detect no other abnormality. Dr. Blanch asked for suggestions as to the future treatment of the child, as in the few similar cases reported no treatment of any kind was mentioned.

Dr. H. D. STEPHENS suggested that at 90° of flexion had been obtained with an anæsthetic, it was worth while attempting to get movement at least at the less painful hip. He suggested that active movements in bed should be attempted, together with the breaking down of a few adhesions at a time under an anæsthetic every few weeks. The child could then be allowed to walk with the aid of crutches in a double Thomas knee splint with a patten on each side to prevent any weight-bearing. If this caused too much pain in the right hip, it might be advisable to fix the right hip in a plaster spica and use the knee splint on the left only.

#### Perthes's Disease.

Dr. Blanch's second patient was a girl of thirteen years with Perthes's disease of the left hip. She came to hospital on August 18, 1930, complaining of occasional limp and pain in the left thigh for the past two to three months. The family history, past history and general examination revealed no abnormality. There was some wasting of the left thigh, 1.25 centimetres (half an inch) difference in the circumference being noticed 12.5 centimetres (five inches) above the upper limit of the patella. There was some limitation of abduction, but other movements were comparatively free. X ray examination of the left femur revealed distortion of the neck, with much flattening and widening of the head, but no segmentation of the epiphysis. The upper border of the acetabulum was hollowed out. The patient was fitted with a walking caliper, which she wore for eleven months. It was then removed, as she had grown out of it. Progressive X ray examination revealed healing of the acetabulum, but no change in the femur. She had remained well and free from pain until two weeks previously, when she complained of pain in the lumbar spine when sitting and very occasional darting pains in the hip. On examination she was found to be a robust child with full and free movements of the spine and left hip, except for slight limitation of abduction. There were 18 millimetres (three-quarters of an inch) of shortening in the left lower limb, and 1.25 centimetres (half an inch) of wasting in the left thigh. X ray examination of the hips revealed no change and the spine was normal.

#### Hæmophilia.

Dr. Blanch's third patient was a boy of three years with hæmophilia, whose grandfather, a hæmophilic, had died from hæmophysis at thirty-five years and whose only other male relative was also a victim of the disease. The patient had been admitted to hospital on six occasions with large hæmatomata, and the first five times had responded to intramuscular injections of mother's or father's blood. On the sixth occasion he had knocked his ankle and bleeding had occurred into the deep muscles of the calf. Later, the blood tracked up to the thigh so that the whole of the left lower limb was about half as large again as the right. Twenty cubic centimetres of blood, given intramuscularly, had no effect, nor had 300 cubic centimetres (ten ounces) given into the peritoneum, but after 240 cubic centimetres (eight ounces) given intravenously the bleeding stopped and his condition rapidly improved.

#### Achondroplasia.

Dr. Blanch also showed a typical achondroplasiac, aged two and a half years, who had been treated with pituitary extract, 0.12 gramme (two grains) daily, but not for a sufficient length of time to determine whether there was any improvement.

#### Abdominal Tuberculosis.

Dr. Blanch's fifth patient was a girl of seven years who came to hospital on November 10, 1931, with a history of vague abdominal pains for six months and acute pain in the right lower part of the abdomen, with vomiting for twenty-four hours. The temperature was normal, pulse rate 80, and respiration rate 20. The breath was abdominal, the tongue coated, and there was rigidity down the right side of the abdomen, with tenderness maximum over McBurney's point. The leucocyte count was 14,062 per cubic millimetre. The pain and vomiting ceased, the leucocyte count fell to 6,069 the following day, but the rigidity and tenderness remained. The condition was regarded as a subsiding attack of appendicitis and the patient was operated upon a week later. The *omentum terminatum* and appendix were found to be studded with tubercles, and a small amount of free fluid was present. The appendix was removed and the child made an uneventful recovery. A month later she returned to the outpatient department with large soft glands in both anterior triangles of the neck. The tonsils were removed, the glands subsided very rapidly, and since then the child appeared perfectly well.

#### Pernicious Anæmia.

Dr. MARGARET ASHTON showed a patient suffering from pernicious anæmia with subacute combined degeneration of the cord.

The patient was a woman, aged fifty-seven years, who had first attended hospital in May, 1928, complaining of pallor, sore tongue, diarrhoea and shooting pain in the hands and feet.

She gave a history of having a severe attack of influenza in 1919, followed a few months later by patchy alopecia, which progressed to complete loss of the hair. There is now no hair on the head except two small patches in the occipital region, no eyebrows and no eyelashes, and no hair in the axillary and pubic areas. The menopause occurred at thirty-eight years of age.

General examination showed pallor, but not a lemon tinted skin, no glossitis, no enlargement of the spleen, and no abnormality in the nervous system, apart from the subjective sensory phenomena. Gastric analysis revealed complete achlorhydria; the Wassermann test yielded no reaction; the fundi were normal. Blood examination revealed red cells 3,200,000 per cubic millimetre, a colour index of 0.7, and films not typical of pernicious anæmia. The patient was given four mils (one fluid drachm) of dilute hydrochloric acid in a lemon drink with meals, and was given pepsin three times a day.

The blood picture did not improve and in October, 1928, the red cells had fallen to 2,250,000 per cubic millimetre, giving a colour index of 1.4, and blood films showed macrocytosis and relative lymphocytosis. The patient was ordered to take 225 grammes (half a pound) of liver daily in addition to the above treatment.



In June, 1929, a blood examination revealed a hæmoglobin value of 70%, red blood cells 3,850,000 per cubic millimetre, a colour index of 0.9. The leucocytes numbered 3,000 per cubic millimetre, and a relative lymphocytosis was present.

Gastric analysis again revealed achlorhydria. Examination of the nervous system revealed absent sense of vibration in the legs as far as the knees, and the subjective sensory symptoms to be the same. The patient still had attacks of diarrhoea. *Liquor arsenicalis*, 0.24 mil (four minims), was added to the dilute hydrochloric acid.

In March, 1930, hæmorrhoids were treated by injection, with relief. In April, 1930, the patient had a severe attack of diarrhoea, was losing weight and was admitted to hospital. Blood examination revealed hæmoglobin value, 65%. The red cells numbered 2,087,000 per cubic millimetre. The colour index was 1.5. The leucocytes numbered 6,250 per cubic millimetre. The halometer reading was 4.3. Anisocytosis and poikilocytosis, relative lymphocytosis were present, but no nucleated red cells were found.

An opaque meal showed no evidence of intestinal malignant disease. Nervous system examination again revealed no abnormality, except for the subjective sensory symptoms and loss of vibration sense in the legs. Adequate liver diet was given, and the patient's condition improved. Soon after being discharged from the ward she went to the country to live.

In February, 1931, she had a severe attack of diarrhoea, and was attended by her own doctor, who ordered continuation of the hydrochloric acid and liver treatment.

Her next attendance at hospital was in March, 1932. She had continued to have the same gastro-intestinal and subjective nervous symptoms, but looked well and had no pallor. At the time of the meeting she had a persistent feeling of numbness in the left little toe, a sensation of "lumps" under her feet when she walked, and a feeling of falling forward at times when walking. The findings on general examination were as before. Nervous system examination revealed slight loss of power in all limbs and patchy anaesthesia to light touch and pin prick over the lower limbs, extending on the trunk to a level midway between the umbilicus and the xiphisternum (seventh thoracic segment). The tendon reflexes were normal in all limbs, the plantar reflex was flexor, and superficial abdominal reflexes were active. There were no symptoms of sphincter involvement. The fundi were normal and a test meal revealed achlorhydria. Blood examination revealed hæmoglobin value of 78%. The red cells numbered 3,530,000 per cubic millimetre. The colour index was 1.1. The leucocytes numbered 5,800 per cubic millimetre. The halometer reading was 4.3. Macrocytes were present. No nucleated red cells were found and no polychromasia was present. Slight relative lymphocytosis was present, and the Arneith index showed a "shift to the right", indicating an increased number of neutrophile cells with nuclei containing five or more lobes, a condition frequently found in pernicious anaemia.

Dr. Ashton pointed out that this patient had not shown the improvement of the blood which should occur with a dosage of 225 grammes of liver a day, and the patient admitted that she had taken it irregularly. The irregular dosage probably accounted for the fact that the improvement had been only partial and a more intensive liver therapy, with the addition of generous amounts of leafy vegetables and red meat, should give a more favourable result.

The patient also illustrated the clinical finding that the subjective nervous symptoms did not tend to improve until the red cell count had passed four million.

Dr. MURRAY TALLENT mentioned that at the present time, at Rochester, Minnesota, experimental work was being done on the value of a diet of high vitamin content, without liver treatment.

Dr. J. P. MAJOR stressed the value of an injection of histamine given during gastric analysis when the diagnosis lay between gastric malignant disease and pernicious anaemia. In pernicious anaemia histamine did not cause the appearance of free hydrochloric acid.

## NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as a member of the New South Wales Branch of the British Medical Association:

O'Brien, Clifford Raymond, M.B., 1926, Ch.M., 1927 (Univ. Sydney), State Hospital, Liverpool.

THE undermentioned have been elected members of the Victorian Branch of the British Medical Association:

McAdam, Cecil Gordon, M.B., B.S., 1915 (Univ. Melbourne), 51, Alma Road, St. Kilda, S.2.

Swinburne, Truman George, M.B., B.S., 1930 (Univ. Melbourne), Melbourne Hospital, Melbourne, C.1.

## Correspondence.

### DIATHERMY OF TONSILS.

SIR: After a brief but generally satisfactory experience of tonsillar diathermy in adults who otherwise would have been subjected to surgical tonsillectomy, I have formed the following conclusions.

1. *Pain During Treatment.*—This is not usually troublesome to patient or surgeon. For anaesthesia I have throughout used surface application by swabbing of cocaine hydrochloride, four grains, in adrenalin, one drachm, giving three applications at five-minute intervals. Anaesthesia does not appear to be perfect, and certainly varies somewhat in the same patient from time to time. It is usually unsatisfactory near the lower pole and lingual prolongation of the tonsil. Also in almost every case, as the tonsil remains become thinner, I have found patients a little more sensitive. Many have stated that the swabbing is the worst part of the treatment, so that, everything considered, it would seem that this method of anaesthesia is but reasonably satisfactory, and I feel that if it could be improved upon it would be an advantage. While on this subject I may mention that I was consulted for relief of pain by a man who had been treated elsewhere. He had a very marked throat reaction, and stated that each treatment had had the same effect. As he lived approximately one hundred miles from his surgeon, it is possible that rather more than is usual was done each time to lessen the number of treatments; but it is also of interest that anaesthesia was by injection. It would be interesting and helpful to hear the opinion of men experienced in the method on this subject.

2. *After-Pain.*—In the large majority of treatments I believe this to be negligible. However, one of my first patients developed considerable swelling and pain during the night following her first treatment. As I was away, I did not see her, but there appears to have been some temporary respiratory obstruction, probably due to glottic oedema. After an uncomfortable night, she settled down and later treatments caused no further trouble. I understand that the first treatment for some reason is most prone to give trouble, and since that happening have limited myself to about two superficial punctures on each tonsil for the first treatment.

The patients generally will state when questioned that they "knew something had been done to the throat", but took their meals and slept as usual. None have refused to have the full number of treatments which I advised.

3. *Effectiveness.*—I regard the method as satisfactory, provided care is taken to destroy all follicles and to open up thoroughly the supratonsillar fossa. This carries one well through the tonsil in the average case, only a thin layer remaining. I always warn the patient that the whole organ has not been removed, and ask him to report for regular inspection or if he notices any recurrence of trouble. It is also pointed out that the treatment can be continued if necessary. This seems to constitute adequate treatment. There can be no doubt that inadequate removal would be just as unsatisfactory as is the case with any badly performed tonsillectomy.

4. *Hæmorrhage*.—This I had not experienced until last week, when it occurred ten days after a first treatment. The patient had relieved her feelings by loud screaming after inadvertently dropping tincture of iodine in her eye. The bleeding came on a few minutes later. It was very easily controlled with morphine and the application of a Yorke's hæmostatic clamp, left on for eight hours. Bleeding recurred about forty-eight hours after removal of the clamp, but the same treatment was again effective and there has been no further trouble.

I have found diathermy to be extremely useful in two patients particularly, who were not good risks for an ordinary tonsillectomy. Both went very well, and one sent his daughter along for treatment by the same method.

The whole procedure is apt to be rather boring and time-consuming for the surgeon, and this may be inclined, I think, to unconsciously prejudice men against its use. Personally, I feel it to be a method of great utility and hope that this undoubtedly minor procedure will, when carefully carried out, be found to be a highly satisfactory substitute for the undoubtedly major procedure of surgical tonsillectomy in an adult.

Yours, etc.,

DONALD NANCE, M.B., B.S.

Colac,

May 26, 1932.

#### OBSTETRICAL RADIOGRAPHY.

SIR: I have read with interest the recent letters in the journal on the above subject.

An X ray examination by an expert with modern apparatus cannot possibly have any harmful effect on either mother or fetus, as the necessary exposure is too small to produce any biological changes. Amateurs should not attempt this work.

Therapeutic applications are altogether different and should be avoided during pregnancy.

The cases in which radiography is of value (and in which the average clinician is frequently at fault, in spite of Professor Windeyer's teachings) are: (i) Multiple pregnancies, (ii) position of limbs in abnormal presentations, (iii) monsters, (iv) bony intrapelvic deformities, for example, spondylolisthesis, exostoses *et cetera*.

Radiographic pelvimetry is difficult and cumbersome, and has no real advantages over the ordinary clinical methods. Amniography, that is, the injection of contrast media into the amniotic sac, is a freak performance only.

Yours, etc.,

J. G. EDWARDS.

185, Macquarie Street,  
Sydney,

June 1, 1932.

SIR: The discussion excited by Dr. Flecker's notes on this subject shows that there are still people anxious to argue the admission of diagnostic radiography into certain of our problems. He can be consoled by the reflexion that the points raised by the opposition are still those used ten years ago. There is plenty of authority for summarily dismissing them nowadays. Those interested in the question of the effects of diagnostic exposures on fetal tissues can follow the work of authorities without much trouble in the current literature.

The prejudice against radiography as a diagnostic method generally is still with us and getting a little tiresome. It is presumption to think that anyone following Professor Windeyer's teachings will achieve his results. They do not. Many attempt Chopin. Nearly all achieve Irving Berlin. One correspondent implies that radiography in obstetrical diagnosis is almost 100% efficient. While not making this claim, the suggestion is made that a method which gives in seconds information which can only be obtained in at least fifteen or twenty minutes by expert physical examination, makes a strong appeal for consideration. And this especially when a button need not be unfastened.

The film reveals the type of pregnancy, the presentation, the relative measurements between the head and pelvic brim, fetal abnormalities in certain instances, flexion or extension of legs in breech presentations, and, in certain percentage, whether the fetus is dead. If two or three guineas is an unjustifiable and unnecessary expense in these circumstances the whole question of the use of radiography in private practice must be reviewed.

Radiologists are not trying to "put over" anything in this matter. Things will not always be as they are. As late as 1912, Selby, the radiologist at the Mayo Clinic, acting under instruction, told a medical meeting at Chicago that while the X ray had a use in examining bone and diseases of the kidney and chest, it was valueless fluoroscopically and otherwise as a method of diagnosis of gastro-intestinal lesions.

It seems that radical changes of opinion do occur.

Yours, etc.,

F. J. GWYNNE,

Honorary Physician, X Ray  
Department, Auckland Hospital,  
New Zealand.

June 1, 1932.

### Post-Graduate Work.

#### POST-GRADUATE LECTURES IN MELBOURNE.

THE Melbourne Permanent Committee for Post-Graduate Work announces that Professor Wood Jones, F.R.S., Professor of Anatomy, University of Melbourne, has consented to deliver a course of lectures concurrently with the annual refresher course, which is to be held in Melbourne from November 7 to November 19, 1932. The subject and details of the course will be announced later.

### Obituary.

HERBERT LILLIES.

WE regret to announce the death of Dr. Herbert Lillies, which occurred on May 30, 1932, at Toorak, Victoria.

ERNEST JOHN CROUCH.

WE regret to announce the death of Dr. Ernest John Crouch, which occurred on June 1, 1932, at Hobart, Tasmania.

### Corrigendum.

THE following concluding paragraph was unfortunately omitted from the article by Dr. John Morton, entitled "Method of Drainage with Irrigation after Prostatectomy", appearing in the issue of June 4, 1932:

In the illustration the perineal tube appears to enter the posterior urethra. This is wrong. It should be shown passing directly into the prostatic sac without touching the urethra.

### Medical Prizes.

#### THE GARTON PRIZE AND MEDAL.

THE Grand Council of the British Empire Cancer Campaign announces that, in accordance with the rules and regulations, the Garton Prize and Medal for the year 1931 will not be awarded, as, in the opinion of the appointed judges, none of the essays dealing with the set subject—"The Early Diagnosis of Cancer"—was of sufficient merit.

## Proceedings of the Australian Medical Boards.

### TASMANIA.

The undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1918*, of Tasmania, as duly qualified medical practitioners:

McLeod, Norman, M.B., B.S., 1923 (Univ. Melbourne),  
Brisbane Street, Launceston.  
Jones, Brynmor Beveridge, M.B., B.S., 1921 (Univ. Adelaide), Launceston.

## Books Received.

RESEARCH WORK ON THE PNEUMOCOCCI AND THEIR ENZYMES AND ITS SIGNIFICANCE IN LOBAR PNEUMONIA, by A. C. Guthrie, M.B.; 1932. London: Baillière, Tindall and Cox. Royal 8vo., pp. 69, with eight plates. Price: 7s. 6d. net.

HISTORY OF SCOTTISH MEDICINE, by John D. Comrie, M.A., B.Sc., M.D., F.R.C.P.; Volumes I and II (published for The Wellcome Historical Medical Museum); Second Edition; 1932. London: Baillière, Tindall and Cox. Crown 4to., pp. 852, with two plates and 404 figures in the text. Price: 50s. net.

CROSSES OF SACRIFICE: THE STORY OF THE EMPIRE'S MILLION WAR DEAD AND AUSTRALIA'S 60,000, by J. C. Waters, with a foreword by General Sir Harry Chauvel; 1932. Australia: Angus and Robertson, Limited. Crown 4to., pp. 130, with illustrations. Price: 6s. net.

SANITARY LAW IN QUESTION AND ANSWER FOR THE USE OF STUDENTS OF PUBLIC HEALTH, by C. Porter, M.D., B.Sc., M.R.C.P., and J. Fenton, M.D., D.P.H.; Third Edition; 1932. London: H. K. Lewis and Company, Limited. Crown 8vo., pp. 236. Price: 7s. 6d. net.

A GUIDE TO ANATOMY FOR STUDENTS OF MEDICAL GYMNASTICS, MASSAGE AND MEDICAL ELECTRICITY, by E. D. Ewart; Third Edition; 1932. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 350, with 98 illustrations. Price: 12s. 6d. net.

THE PRACTICAL MEDICINE SERIES: OBSTETRICS AND GYNECOLOGY; Series 1931. Chicago: The Year Book Publishers. Crown 8vo., pp. 666, with illustrations. Price: \$2.50 net.

THE PRACTICAL MEDICINE SERIES: GENERAL THERAPEUTICS; Series 1931. Chicago: The Year Book Publishers. Crown 8vo., pp. 467, with illustrations. Price: \$2.25 net.

DELIVERANCE FROM CANCER: A VINDICATION OF FOOD REFORM AND NATURE CURE, by H. Reinheimer; 1931. London: Rider and Company; Melbourne: Robertson and Mullens, Limited. Crown 8vo., pp. 192. Price: 8s. 6d. net.

## Diary for the Month.

JUNE 14.—New South Wales Branch, B.M.A.: Ethics Committee.  
JUNE 15.—Western Australian Branch, B.M.A.: Branch.  
JUNE 21.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
JUNE 22.—Victorian Branch, B.M.A.: Council.  
JUNE 24.—Queensland Branch, B.M.A.: Council.  
JUNE 28.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
JUNE 30.—South Australian Branch, B.M.A.: Branch.  
JUNE 30.—New South Wales Branch, B.M.A.: Branch.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi.

AUSTIN HOSPITAL FOR CHRONIC DISEASES, HEIDELBERG, VICTORIA: Junior Resident-Medical Officer.

BALMAIN AND DISTRICT HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.

LAUNCESTON PUBLIC HOSPITAL, TASMANIA: Resident Medical Officer (male).

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

## Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associated Friendly Societies' Medical Institute. Mount Isa Mines. Toowoomba Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

## Editorial Notices.

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